INDEX TO VOLUME 56

[NOTE.—In this index the title to principal papers and headings of departments, as *Discussions*, are in italics.]

Abstracts, *Anion metasomatic replacement reactions* (Ames), 521
Application of the method of local X-ray spectrum analysis to investigation of the platinum group minerals (Borovsky), 1159
Aspects of archaean structure and mineralization (Goodwin), 897
Basic geologic features of manganese deposits of Bol'shoi Tokmak (Gryaznov and Yu), 221
Bauxite in Sarawak (Wolfenden), 972
Behavior of radioactive elements during the processes of formation of endogenous deposits (Betekhtin), 219
Beryllium-bearing tuff in the Thomas Range, Juab County, Utah (Staatz, Griffitts), 941
Biogenic sulfides (Baas Becking, Moore), 259
Breccia and pebble columns associated with epigenetic ore deposits (Bryner), 488
Cation metasomatic replacement reactions (Ames), 1017
Chemical aspects of bauxite genesis in Jamaica (Burns), 1297
Chemical characteristics of the ground water resources of Jamaica, W. I. (Hill, Ellington), 533
Classification of molybdenum deposits (Khrushchov), 1158
Coke formation in coal due to influence of a sulfide vein (Sukhanova), 1159
Colloform formation of garnet and molybdenite in ores of the Shalym deposit (Vakhrushev), 224
Comparison of analytical methods used in geochemical prospecting for copper (Huff, Lovering, Lakin, and Myers), 855
Conditions of occurrence and composition of platinum group minerals in ores of the Noril'sk deposit (Genkin), 1159
Content of trace amounts of silver in galena ores from Broken Hill, Australia (Bounsall), 608
Copper, lead and zinc in rivers draining Chilean Andes (Degrys), 1456–1464
Copper, vanadium, and uranium deposits in sandstone—their distribution and geochemical cycles (Fischer, Stewart), 509

Abstracts—*Continued*
Crocidolite from the Koegas-Westerberg Area, South Africa. Part 1. Occurrence (Cilliers), 1421–1429; *Part 2. Mineralogical investigation* (Freeman, Hodgson, and Taylor), 1429
Crystal habit and trace element content of some galenas (Marshall, Joensuu), 758
Data of lead isotope geology related to problems of ore genesis (Cannon, Pierce, Antweiler, and Buck), 1
Determination of apparent angles of inclined linear elements (Hagen), 204
Distribution of minor elements in the gonditic manganese ore, and its geochemical significance (Mookherjee), 723
Distribution of uranium ore deposits in the elk ridge area, San Juan County, Utah (Campbell, Lewis), 111
Economic aspects of archaean-proterozoic boundaries (Berry), Osborne, 1314
Enriched parts, conditions of localization of, of ore bodies in Uch-Ochak deposit, (lead-zinc) (Nekrasov), 1479
Equilibria in sulfur containing aqueous solutions, in the system Fe-S-O, and their correlation during ore deposition (Barnes, Kullerud), 648
Exogenetic processes in the formation of uranium deposits (Betekhtin), 1156
Experimental data on the crystallization of uranium dioxide under hydrothermal conditions, some (Ra Fal'sky and Kondykin), 1480
Experimental investigation of solid diffusion and volatilization of certain metallic sulfides (MacDougall, Meikle, guy-Bray, Saull and Gill), 362
Features of the deposition of barite and sulfides of nonferrous metals in Madneuli deposits (Nazarov), 1160
Genesis and control of the Linchburg orebody, Socorro County, New Mexico (Titley), 695
Genetic types of tin deposits in Polousnyi Range and Selennyakh Ridge (Nekrasov), 223
Geochemical prospecting for nickel in the Blue Mountain area, Jamaica, W. I. (Hill), 1025

Abstracts—*Continued*
Geochemical prospecting investigations in the Northern Rhodesian copperbelt (Tooms and Webb), 815
Geological structure of the copper-nickel deposit of the northern part of Rudnaya Mountain (Zontov), 1001
Geological structure of the Gora Vysokaya ore-bearing field (Ovchinnikov and Maksenkov), 620
Geology and ore deposits of the Mattagami area, Quebec (Jenney), 740
Geology and origin of mineralized breccia pipes in Copper Basin, Arizona (Johnston, Lowell), 916
Geology and peculiarities of localization of the South-Yakutian iron ore deposits (Pukharev), 222
Geology of Cleora mining district gypsum deposits, Wellsville area, Colorado (Reeves), 772
Geology of ore deposits. Academy of Sciences of the USSR, No. 1, 219; No. 2, 447; No. 3, 619; No. 4, 796–801; No. 5, 1001–1006; No. 6, 1156–1161
Geology of ore deposits, Russian serial abstracted in English, 1476–1480
Geology of the Temiscamie iron formation, Lake Albanel, iron range, Mistassini territory, Quebec, Canada (Quirke), 299
Ground-water control in the Neyveli Lignite field, South Arcot district, Madras State, India (Jones and Subramanyam), 273
Hydrothermal metamorphism of the country rocks in lead-zinc and base metals deposits of Georgia (Ivanitsky), 1160
Influence of enclosing rocks on the process of ore deposition in hydrothermal uranium deposits (Pelymsky), 1157
Introduction to geophysical prospecting, 2nd Edit. (Dobrin), 625
Iron content of sphalerite from the Central district, New Mexico and the Bingham district, Utah (Rose), 1363
Iron ore deposits of El-Bahariya Oasis, Egypt, the (Nakhla), 1103
Iron ore resources of the North-Eastern Congo (Woodtli), 1385
Jadeite, the problem of (Moskaleva), 1480
Late Pleistocene and Recent accumulation of uranium in ground water saturated sandstone deposits (Rosholt), 423
Lead, copper, zinc and molybdenum content of some limestones and related rocks in Southern Ontario (Warren, Delavault), 1265
Lead zinc deposits of the Elbruz ore field, main features of (Vol'fson and Lezin), 1478
Abstracts—*Continued*
Lead isotopes in ores and rocks of Butte, Montana (Murthy and Patterson), 59
Magnetite-carbonate ores in the series of ferruginous quartzites of the magnetic anomaly of Kursk (Klagish), 450
Mineral composition and peculiarities of ore formation in ferberite-antimonite deposits of Gornaya Racha (Strakhova), 450
Mineralogy and genesis of the wolframite ore deposits, Needle Hill mine, New Territories, Hong Kong (Davis), 1238
Metallogenic maps (Lang), 1123
Metasomatic replacement of limestones by alkaline, fluoride-bearing solutions (Ames), 730
Metasomatic zoning during argillitization of granite-porphyries near the ore bodies (Kazitsyn and Aleksandrov), 1004
Mineral composition and the distribution of mineralization in the Kurgan district (Brodin), 1003
Mineralogy and the question of zoning Northwestern Illinois zinc-lead district (Bradbury), 132
Minor elements in a metasomatic zone related to a copper-bearing pyrite deposit (Kuroda), 847
Morphologic features of cassiterite from the Dzhalinda deposit in Malyi Khingan (Komarova, G. N.), Alexandrov, 451
Morphologic features of quartz and cassiterite in the Shakh Shagaily deposit, 622
New types of rare metals deposits (Ginzburg), 620
Nickel occurrences in soapstone deposits, Saline County, Arkansas (Sterling, Stone), 100
Observations on cation exchange in some manganese minerals by electrodialysis (Sreenivas and Roy), 198
Occurrence of chillagite in tungsten-bearing veins of the Dzhidinskoe deposit (Korzhinskaya and Vasil'ev), 225
Occurrence of radioactive fluoritic sandstone, Wet Mountains, Colorado (Boyer), 780
Ore deposits of the Bannockburn basin, Lardeau area, British Columbia (Reed), 392
Organic sequestration of copper (Fraser), 1063
Pacific ore-bearing belt, main features of the northwestern part of the (Atsikson, et al.), 1476
Paragenetic relations of minerals in hypogene ores of the Chinasyl-Sai deposit (Pen'kov), 224

Abstracts—*Continued*

Pegmatites, granite, the depths of formation of (Ginzburg and Rodionov), 1478

Pegmatites of basic rocks in Monchetundra and the associated sulfide mineralization (Karpov), 1004

Perouskite mineralization in the Vuoriyarvi massif (Borodin), 1001

Phase relations in the system Ni-As (Yund), 1273

Phosphates, climate and the accumulation of (Strakov), 1476

Pitchblende, behavior of, under the influence of flourine bearing hydrothermal solutions (Rekharsky), 1479

Pobednoe iron deposit (Potapova), 622

Possible masked heavy mineral deposit, Florida panhandle (Tanner, Mullins and Bates), 1079

Primary mineralization zoning in the ore field of Almalyk (Koroku and Badalov), 1002

Principles of distribution of sulfide copper-nickel deposits in the region of Pechenga (Kola Peninsula), Gorbunov), 221

Principles of outlining the metallogenetic regions (Shatalov), 619

Problem of genesis of the copper-nickel sulfide deposits of the Siberian platform (Godlevsky), 448

Problem of the zone of weathering and its relation to bauxites of the Northern Urals basin (Vinokurov and Gutkin), 1480

Prospecting for ore deposits by panning heavy minerals from river sands (Zeschke), 1250

Prospects for gold mineralization in the region of Mugodzhary Mountains (Bilibina and Bogdanov), 1005

Pumice and perlite in a rhyolite complex in Hungary (Otvos), 1112

Pyrite body and copper ore bodies, Cerro de Pasco mine, Central Peru (Ward), 402

Radioactivity and tertiary volcanic activity in Egypt (Gindy), 557

Relation of dikes of melanocratic rocks to gold mineralization in the central deposit (Rozanova), 451

Relationship of general structure to gold mineralization in the Kilo area, Central Africa (Woodtli), 584

Remanent magnetism and the origin of hard hematites in Precambrian banded iron formation (Gross and Strangway), 1345

Replacement of sulfides by carbonates and quartz of later generation in the "Verkhnii Rudnik" (Mozgova), 224

Abstracts—*Continued*

Role of enclosing rocks in the process of formation of the endogenetic mineral deposits (Tatarinov), 447

Role of replacement in the origin of some cockade textures (Kutina, Sedlackova), 149

Rotation properties of certain anistropic ore minerals (Cameron, Gavis, Guilbert, Larson, Mancuso, and Sorem), 569

Sandstone-type uranium deposits at Ambrosia Lake, New Mexico—an interim report (Granger, Santos, Dean, and Moore), 1179

Secondary glauconite in the Biwabic iron-formation of Minnesota (Tyler, Bailey), 1033

Sixtieth birthday of academician D. S. Korzhinsky (Betekhtin and Sokolov), 1156

Some aspect of the geochemistry of sphalerite, Central City district, Colorado (Sims and Barton), 1211

Some features of distribution of belts of tin and lead-zinc deposits (Gorzhevsky), 621

Some new data on magnesian magnetites (Pavlov and Yanchenko), 450

Some peculiarities of titanomagnetite ore deposits of the southern Urals and their metamorphism (Myasnikov), 449

Some possible geologic relationships in the formation of uranium^{235} *from curium*^{247} (Adler), 689

Some regularities in metamorphism of the pyritiferous lead-zinc deposit of Tekeli (Shadlun), 1002

Source of Brackish ground water in Pleistocene formations beneath the Dutch Polderland (Volker), 1045

Stratigraphic succession and structure in the Zinc Corporation Ltd. and New Broken Hill Consolidated Ltd., Broken Hill, New South Wales (Carruthers, Pratten), 1088

Structural peculiarities of the lead-zinc deposit of Zambarak in eastern Karamazar (Nekrasov), 621

Studies on the oxidation of goethite (Gokhale), 1058

Studies on the oxidation of magnetite (Gokhale), 903

Sulfide ores formed from sulfide-deficient solutions (Lovering), 68

Temperatures of formation and origin of the Nigadoo and Brunswick Mining and Smelting No. 6 deposits, New Brunswick, Canada (Kalliokoski), 1446–1455

Temperatures of mineralization by liquid inclusions, cave-in-rock, fluorspar district, Illinois (Freas), 542

Abstracts—*Continued*
Tephroite in California manganese deposits (Hewett, Chesterton and Troxell), 39
Textures due to unmixing of solid solutions in ores altered by metamorphism (Filimonova), 622
Theory to practice in soil mechanics (Terzaghi), 624
Thorium mineralization in the Lemhi pass area, Lemhi County, Idaho (Anderson), 177
Trace elements in pyrite, pyrrhotite and chalcopyrite of different ores (Hawley, Nichol), 467
Tropical Africa (Kimble), 624
(Tungsten) *geological structure of the Bukuka deposits, some features of* (Druzhinin), 1479
Tungsten mineralization of the northeast of the USSR (Matveenko), 449
Uranium migration and geochemistry of uranium deposits in sandstone above, at, and below the water table. Part I. Calculation of apparent dates of uranium migration in deposits above and at the water table (Rosholt), 1392–1403; *Part II. Relationship of uranium migration, dates, geology, and chemistry of the uranium deposits* (Robinson and Rosholt), 1404–1420.
Uranium mineralization at the Midnite mine, Spokane, Washington (Barrington, Kerr), 241
Uranium mineralization in sedimentary carbonate rocks (Danchev), 1157
Volume relationships during replacement reactions (Ames), 1438–1445
Wall-rock alteration at the Cedar Bay mine, Chibougamau district, Quebec (Miller), 321
Zonal distribution of deposits in the Polodauri ore field (Bachaldin), 1005
Zoning of mineralization in cupriferous sandstones of the Udokan deposit (Domarev and Bogdanov), 220
Accessory and Other Minerals, Ambrosia Lake, 1201
Actinolite, 326
Adirondacks, lead isotopes in, 16
Adler, Hans, H., *Possible geologic relationships in the formation of uranium^{235} from curium^{247}*, 689
Adsorption and absorption of copper, 1068
Aeschynik-priorite, 443
African, ages in the Precambrian, 642
Archean-proterozoic boundaries, 642
(*central*), *Relationships of general structure to gold mineralization in the Kilo area* (Woodtli), 584
Gold impregnation deposits in the Moto area (Woodtli), 603
African—*Continued*
Geochemical prospective investigations in the Northern Rhodesian Copperbelt (Tooms and Webb), 815
iron formation, 642
Liberia, Bomi Hills, 642
Liberia, Nimba, 642
Mauritania, Fort Gouraud, 642
Precambrian mineral deposits, 642
Precambrian Transvaal nucleus, 642
Witwatersrand series, 642
Age calculation, methods, 1395
Age calculations, radiochemical analyses, 425
Age determinations, Ambrosia Lake, 1208
Agricultural limestone, lead contamination, 1270
Agua Zarca sandstone Chinle, 516
Alaska, Placer cassiterite of the "Manley tin belt" (Stanley), 213
Alaska, Valley of the Ten Thousand Smokes, 86
Al'bou, M. N., review of book by, 1482
Alderman on dolomite, 261
Aleksandrov, G. V., abstract of article by, 1004
Alexandrov, Eugene A., abstracts of articles by, 219–225, 447–451, 619–623, 796–800, 1001–1006, 1156–1161
Alexandrov, E. A., book reviewed by, 1318
Russian serial abstracts, 1476–1480
Allanite, 183, 567, 691
Allen, A. W., on bauxite, 976
Allen, E. T., et al., on pyrite, 261
Lassen peak, 96
Allen, J. R. L., on sediments, 997
Allen, U. T., on bauxite, 980
on leucoxene, 1142
Alteration, 323
hydrothermal at Mattagami area, Quebec, 752
Linchburg mine, New Mexico, 702
zones, 323
Ambrosia Lake, New Mexico—an interim report, sandstone-type uranium deposits (*Granger, Santos, Dean, and Moore*), 1179–1210.
Ames, L. L. Jr., *Anion metasomatic replacement reactions*, 521
Cation metasomatic replacement reactions, 1017
on fluid inclusions, 87
Metasomatic replacement of limestones by alkaline, fluoride-bearing solutions, 730
Volume relationships during replacement reactions, 1438–1445
Ames, L. L., Jr., and Mercer, B. W., communication, 1133
Amin on lead-zinc deposits, 563
Amphiboles, 706
Analysis method, 365
of sphalerite, 1223

Analysis of sphalerite, Barnett, P. R., 1236
Analytical methods used in geochemical prospecting for copper, Comparison of (Huff, Loverine, Lakin and Myers), 855
Anatase, 1201
Anders on manganese oxides, 198
Anderson, A. L., on uraninite, 255
Anderson, Alfred L., *Thorium mineralization in the Lemhi Pass area, Lemhi County, Idaho*, 177
Andersonite, 1199
Anion metasomatic replacement reactions (Ames, Jr.), 521
Ankerite, 161, 307, 313, 315, 317
Anorthosites, 1314
Antweiler, J. C., Cannon, R. S., Jr., Pierce, A. P., and Buch, K. L., *The data of lead isotope geology related to problems of ore genesis*, 1
Antigorite, nickel in, 1031
Apatite, 185, 326
Appalachian zinc deposits, 490
Aquifers, Tertiary, India, 286–296
Archbold, N. L., on plateau uranium, 1194
Archaean, 1314
  continental nuclei, characteristics of (list), 636
  proterozoic boundaries, economic aspects of (Derry), 635
  structure and mineralization (Goodwin), 897
Argentiferous, 415, 418
Argentite by sulfate reduction, 267
Arizona, Bagdad, 492, 501
  Bisbee, 492
    pebble dikes, 498
  Copper Basin area, general geology, 919
    district, magnetic and soil sampling data, 938
  Copper Creek, 499
  dripping spring quartzite, uraninite veins, lead isotopes in, 24
  geology and origin of mineralized breccia pipes in Copper Basin (Johnston and Lowell), 916
  Hopi county diatremes, 495
  Johnson Camp, 502
  Aramide ore deposits, 936
  late Tertiary ore deposits, 939
  Navajo-Hopi diatremes, 493
  Precambrian ore deposits, 936
  Precambrian rocks, 919
  Prescott, 492
  structure, Copper Basin district, 923
  Yavapai Co., lead isotopes in, 16
Arkansas, nickel occurrences in soapstone deposits, Saline County, (Sterling and Stone), 100
  Ouachita Mtns., igneous rocks, 103
    nickel mineralization, 104
    regional structure, 103
    sedimentary rocks, 101
    soapstone deposits, 104
Arkose, 512
Armstrong, H. S., on archaean, 636
Arsenopyrite, 247
Artesian aquifers, India, 287
  systems, recharge, 288
Asari on monazite, 442
Asbestos, South Africa, 1421, 1437
Aspects of archean structure and mineralization (Goodwin), 897
Attia on Egyptian iron, 1103
Aune, Quintin A., review of maps by, 1154
Austin, R. on ferroselite, 1200.
Australia, breccia pipes, 489
  Kidston, 492
Aspects of archaean structure and mineralin the Zinc Corporation Ltd. and new Broken Hill Consolidated Ltd., Broken Hill, New South Wales (Carruthers and Pratten), 1088
Autunite, 247, 249, 251, 1199

Baadsgaard, H., on Animikie rocks, 638
Baas Becking, L. G. M., on bacteria, 262
Bachaldin, V. I., abstract of article by, 1005
Badalov, S. T., abstract of article by, 1002
Bailey, S. W., on exothermic reactions, 554
  on heating stages, 546
  on leucoxene, 1142
  on solutions, 147, 148
  with Tyler, S. A., *Secondary glauconite in the Biwabic iron-formation of Minnesota*, 1033
Ball on Egyptian iron, 1103
Baltic shield, 636
Bancroft, M. F., on Bannockburn, B. C., 401
  on Bannockburn, B. C. structure, 396
  on British Columbia, 392, 393, 394
Banded iron formation, asbestiferous, 1421–1437
Bandy on paragenesis, 96
Barite, 134, 188, 545, 1201
Barite hypogene, 419
Barnes, H. L., and Kullerud, G., *Equilibria in sulfur-containing aqueous solutions, in the system Fe-S-O, and their correlation during ore deposition*, 648
Barnett, P. R., *Analysis of sphalerite*, 1236
Barrington, Jonathan, and Kerr, Paul F., *Uranium mineralization at the Midnite Mine, Spokane, Washington*, 241
Barth, T. F. W., on volcanism in Iceland, 74
Barton, P. B. on sphalerite, 1365
Barton, P. B., Jr. on sulfides, 1226
Barton, P. B., Jr. with Sims, P. K., *Some aspects of the geochemistry of sphalerite, Central City district, Colorado*, 1211–1237
Basin and range province, 489
Bastnaesite, 691

Bateman, A. M., Brazil, 645
copper, 271
on covellite, 265
on cockade textures, 150
review of *Geological survey in 1960*, 452
Bates, John D., with Tanner, William F., and Mullins, Allan, *Possible masked heavy mineral deposit, Florida panhandle*, 1079
Bates, Robert L., Review of book by, 453
Baudisch on magnetite, 964
Bauxite, definition of, 972
from amphibolite gabbro, Sarawak, 978
from Andesite, Sarawak, 974
from gabbro and diorite, Sarawak, 976
from volcanic rocks, Sarawak, 978
Genesis in Jamaica, some chemical aspects of (Burns, D. J.), 1297–1303
in Sarawak (Wolfenden), 972
relation to bedrock, Sarawak, 973
Bayley, W. S. on iron formation
Beadnell on Egyptian iron, 1103
on oligocene, 566
Beck, R., on cockade textures, 150
Becking, L. G. M. Baas, and Moore, D., *Biogenic sulfides*, 259
Behre on ore solutions, 147
Benningson, F. with Friedrich, K., on System Ni-As, 1287
Benson, K. E., on sulfides, 1227
Bentley et al. on curium, 691
Bentz, A., review of book by, 1483
Bergeron on iron formation, 640
on Proterozoic, 638
Bergquist on iron formation, 1040
Beryllium-bearing tuff in the Thomas Range, Juab County, Utah (Staaz and Griffitts), 941
Beschel on chelation of copper, 1075
on copper in peat, 1067
Betekhtin, A. G., abstract of article by, 1156
on regional metallogeny, 1125
Bilibina, T. V., abstract of article by, 1005
Billingsley on pebble dikes, 498
Bieler on clay alteration, 252
on quartz, 245
Bilz on sulfur-sulfide system, 261
Biogenic sulfides (Becking and Moore), 259
Biological and chemical processes, 262
Biotite, 182
Bisbee, 499
on breccia bodies, 497
Wisser on Bisbee, 502
Bismuthinite, 419
Blacksands of Rosetta, Egypt, Radioactivity in monazite, zircon, and "radioactive black" grains in (Gindy), 436
Blais on iron formation, 640
on Proterozoic, 638
Blind River, lead isotopes in galenas, 24
lead isotopes in, 24
Block diagram inclined linear elements, 205
ore bodies, Ambrosia Lake district, New Mexico, 1189
Bogdanov, Yu. V., abstract of article by, 1005
Bolivia, Tertiary channel gold deposits at Tipuani (Stoll, W. C.), 1258–1264
Bolsonada deposits, 420
Borchert, Hermann, review of book by, 1161
Bornite, 94, 368
and chalcopyrite by sulfate reduction, failure to produce, 269
Borodin, L. S., review of article by, 1001
Borooah, S. K., discussion, 1472
Borovsky, I. B., et al., abstract of article by, 1159
Bounsall, E. J., *Content of trace amounts of silver in galena ores from Broken Hill, Australia* (Bounsall) (communication), 608
Bowditch on Cerro de Pasco, 404
Bowen on silicate melts, 79
Boydell on colloids, 255
Boyer, Robert E., *Occurrence of radioactive fluoritic sandstone, Wet Mountains, Colorado*, 780
Bradbury, James C., *Mineralogy and the question of zoning, northwestern Illinois zinc-lead district*, 132
Braunite, 200
Brazil, Jacobina, 645
Minas Gerais basin, 644
Proterozoic, 644
quartz pebble conglomerates, 645
Breccia and cockade textures, principal existing views on the origin of, 149
and pebble columns associated with epigenetic ore deposits (Bryner), 488
co-hydrothermal, 497
breccia & shatter pipes, 499
pebble dikes, 498
porphyry copper deposits, 502
dimensions, 491
matrix, 492
other geologic features, 492
prehydrothermal filled sink structures, 497
igneous non-effusive columns, 496
rock fragments, 491
tectonic types, igneous effusive columns, 493
Brief outline of a possible origin of copper porphyry (Kents) (communication), 1464–1469
"dikes," 491
pipes in Copper Basin, Arizona, geology and origin of mineralized (Johnston and Lowell), 916
origin, 931
porphyry copper relation, 935
"reef," 491
Breger, I. A., on carbonaceous matter, 1196

Brett, Robin, *Magmatic-pegmatitic-hydrothermal sequence at Lacorne, Quebec*, 784
Bretz, J. H., breccias, 497
Brill on Colorado stratigraphy, 772
British Columbia, Ore deposits of the Bannockburn Basin, Lardeau Area (Reed), 392
Brodin, B. U., abstract of article by, 1003
Broken Hill, Australia, Content of trace amounts of silver in galena ores from (Bounsall), (communication), 608
lead isotopes in, 16
New South Wales, Stratigraphic succession and structure in the Zinc Corporation Ltd. and New Broken Hill Consolidated Ltd. (Carruthers and Pratten), 1088
Broughton, H. J., on leucoxene, 1142
Brown, J. S., on diffusion, 363
Brown, W. R. on iron formation, 999
on sources of ore-lead, 17
Browns Park formation, 514
Brushy Basin members, 514
Bryant, Donald G., on Bisbee, 498
Bryner, Leonid, *Breccia and pebble columns associated with epigenetic ore deposits*, 488
discussion of paper by, 1149
Buch, K. L., with Cannon, R. S., Jr., and Pierce, A. P., and Antweiler, J. C., *The data of lead isotope geology related to problems of ore genesis*, 1
Buddington, A. F., et al., on magnetite, 971
Buddington, A. F., metallogenetic provinces, 1124
Buerger, M. J., wood tin, 213
Burbank, W. S., on breccia pipes, 494
on Red Mountain, Colo., 501
Burns, D. J., *Some chemical aspects of bauxite genesis in Jamaica*, 1297–1303
on serpentinite, 1026
Burst on glauconite, 1040, 1041
Butler, B. S., on breccia pipes, 491, 503, 931, 932
on Cactus Pipe, Utah, 501
obituary by A. M. Bateman, 210
Butler, J. R., discussion by, 442
Butte, Montana, Lead isotopes in ores and rocks of (Murthy and Patterson), 59
pebble dikes, 495
Byström, Marie, on manganese oxides, 198

Cahen, L. on lead, 608
Calcite, 134, 145, 190, 521, 526, 545
California, manganese deposits in, 42
manganese deposits, Tephroite in (Hewett, Chesterman, and Troxel), 39
Calvert, L. D. with Heyding, R. D., on niccolite, 1276
on $NiAs_2$, 1277
on $Ni_{1-x}As_2$, 1275
Calvin, L. D., on copper complexing, 1076
Cameron, E. N., Davis, J. H., Guilbert, J. M., Larson, L. T., Mancuso, J. J., and Sorem, R. K., *Rotation properties of certain anisotropic ore minerals*, 569
Cameron, E. N., on exothermic reactions, 554
on heating stages, 546
on leucoxene, 1142
on "minerogenetic," 1124
on ore solutions, 147, 148
Campbell, Russell H., and Lewis, Richard Q., *Distribution of uranium ore deposits in the Elk Ridge area, San Juan County, Utah*, 111
Cangalli, gold bearing, 1260
Cannon, R. S., Jr. and Pierce, A. P., and Antweiler, J. C., and Buch, K. L., *The data of lead isotope geology related to problems of ore genesis*, 1
Cannon, R. S., Jr., and Silver, L. T., on lead isotopes at Sudbury, 16
Cannon, H. B. on ilmenite, 994
on lead isotopes, 23, 29
Cañon Diablo, lead in, 4
Capillarity to concentrate copper, 1065
Carbonaceous matter, Ambrosia Lake, 1195
Ambrose Lake, theories of origin, 1197
Carbonate at Chibougamau, 327
Carles on hot springs, 96
Carnotite, 24
Carron on weathering, 980
Carruthers, D. S., and Pratten, R. D., *Stratigraphic succession and structure in the Zinc Corporation Ltd. and New Broken Hill Consolidated Ltd., Broken Hill, New South Wales*, 1088
Cassiterite, 412
of the "Manley Tin Belt," Alaska, Placer (Stanley), 213
Cation exchange in some manganese minerals by electrodialysis, observations on (Sreenivas and Roy), 198
Cation metasomatic replacement reactions (Ames, Jr.), 1017
Cavender on Lemhi Pass, 180
Cavity fillings, 544
Central City district, Colorado, Some aspects of the geochemistry of sphalerite (Sims and Barton), 1211–1237
Cerite, 691
Cerro de Pasco Mine, Central Peru, the pyrite body and copper orebodies (Ward), 402
Cerussite, 134, 564
Chaikovskii, V. K., review of book by, 1153
Chalcedony, 190
Chalocik, 94, 368, 418
steely gray, 418
Chalcophanite, 200
Chalcopyrite, 134, 247, 368, 416, 418, 545, 612, 706
ore in conglomerate, 612

Chalcopyrite—*Continued*
pyrrhotite and pyrite of different ores, trace elements in (Hawley and Nichol), 467
quantitative analyses, 480
volatile transfer, 388
Chaudron on magnetite, 964
Chelation in peat of copper, 1065
Chemical analyses, Hulett Creek, Wyo., 1409
Chemical, aspects of bauxite genesis in Jamaica (Burns, D. J.), 1297–1303
characteristics of the ground water resources of Jamaica, W. I. (Hill and Ellington), 533
characteristics of the ground water resources of Jamaica, W. I. (Versey, H. R.) (discussion), 1316–1317
composition pumaceous perlitic rhyolite, Hungary, 1115
control ore deposition, 419
Chernyshev, G. B., Review of book edited by, 1151
Chert, 317, 1424
syngenetic, 419
Chesterman, C. W., with Hewett, D. F., and Troxel, B. W., *Tephroite in California manganese deposits,* 39
Chibougamau, 641
(Campbell) mine, analysis of pyrites, 472
district, Quebec, wall-rock alteration at the Cedar Bay Mine (Miller), 321
Chilean Andes, Copper, lead and zinc in rivers draining (Degrys), 1456–1464
Chimney, 606
Chinle and Moenkopi formations, stratigraphy of, 113
permeability of, 120
formation, Shinarump member, 515, 516
Chlorite, 323
Chowdbury on copper analyses, 983
Christ, C. L., on uranium solubility, 1420
Chromium in chalcopyrite, 481
in pyrites, 476
in pyrrhotite, 479
Chrysocolla, 561
Cilliers, J. J. LeR., *Crocidolite from the Koegas.-Westerberg Area, South Africa. Part I. Occurrence,* 1421–1429
Clark, J. D., on colloids, 255
Clark, Thomas H., review of book by, 623
"Clastic dikes," 490
sediments to volcanics, relation of, Michipicoten area, Ont., 901
Clinozoisite, 324
Clostridium desulfuricans, 262
Cloud on glauconite, 1041
on Greenland ages, 1040
Coal, Peru, 985
Cobalt, 641
in chalcopyrite, 480
Cobalt—*Continued*
nickel ratios in chalcopyrite, 480
in pyrites, 475
in pyrrhotite, 478
in pyrites, 474
in pyrrhotites, 477
in sulfides, 481
sulfide volatile transfer, 387
Cockade and breccia textures, principal existing views on the origin of, 149
texture, Czechoslovakia, 165
figures, 153–160, 162–64, 166–70
from Polkanová near Banská Bystrica, Slovakia, 152
the role of replacement in the origin of some (Kutina and Sedláčková), 149
Slovakia, 162
Coeur d'Alene lead isotopes, 30
uraninite vein, lead isotopes in, 24
Coffinite, 24, 251, 1198
Co-hydrothermal breccia & pebble columns, 491
Coleman on uranium deposition temperature, 126
Colloidal deposition of uraninite, 255
Color of sandstone, guide to ore, Ambrosia Lake, 1193
Color zonation, 547
Colorado, Bassick Mine, 496
Bull Domingo Pipe, 496
climax, 504
Cresson "blowout"
Cripple Creek, Cresson pipe, 496
Jefferson County, Malachite Mine, geology
Geology of Cleora Mine district gypsum deposits, Wellsville area (Reeves, Jr.), 772
Maverick gypsum deposit, 776
Maybell, 514
mineral belt, 75
occurrence of radioactive fluoritic sandstone, Wet Mountains (Boyer), 780
Pando, 497
Park Range, lead isotopes in, 16
plateau, 489
sandstone-type deposits, lead isotopes in, 24
Red Mountain, 492, 501
breccia pipes, 494
Silverton Caldera, 492
Some aspects of the geochemistry of sphalerite, Central City district (Sims and Barton), 1211–1237
Swissvale gypsum deposit, 776
Tumble Mountain gypsum deposits, 774
Columnar section, Bannockburn Basin area, 394
Combustion furnace, 364
tube, 364
Communications—
A new core orientation device (Roxstrom), 1310

Communications—Continued
Brief outline of a possible origin of copper porphyry breccias (Kents), 1465–1469
Contact metasomatic copper mineralization at the Calzada Mine, Peru (Stoll), 612
Content of trace amounts of silver in galena ores from Broken Hill, Australia (Bounsall), 608
Description and origin of sulfides in pillow lavas, Mayburn mines property Kenora district, Ontario, Canada (Montgomery), 1305
Detection of radio-active minerals with infrared aerial photography (Winkler, Voight), 211
Modified field method for the determination of nickel in the presence of copper (Hill and Ellington), 982
Placer cassiterite of the Manley Tin Belt, Alaska (Stanley), 213
Radioactivity in monazite, zircon, and radioactive black grains in blacksands of Rosetta, Egypt (Gindy), 438
Short review of Peru's mineral resources (Stoll), 985
Uranium-bearing bodies in the ore deposits of Traversella, Italy (Zucchetti), 1469–1471
Unusual occurrence of molybdenite in a manganese mine, in Tailevu Province, Fiji (Rickard), 991
Use of clinoptilolite to remove potassium selectively from aqueous solutions of mixed salts (Ames, Jr., and Mercer), 1133
Comparison of analytical methods used in geochemical prospective for copper (Huff, Lovering, Lakin, and Myers), 855
Comstock on Arkansas nickel, 100
Concentrating heavy minerals, 1251
Concentric banding of nickel arsenides, 1293
Conglomerates, lead isotopes in, 24
metasomatized, 612
uranium at Elliot Lake, Ontario, 641
Congo, geology of Kilo gold fields, 585
Gold impregnation deposits in the Moto area (Woodtli), 603
gold mineralization, Moto area, no structural control, 606
granites, kilo area, 585
iron deposits, 589
Kilo gold field ore deposits, 589
Moto area, black schists, 605
Moto area, itabirite, 605
Moto gold field, "Séries du Kibali," 604
Northeastern, iron ore resources of the (Woodtli) 1385–1391
Precambrian rocks, Kilo area, 585
Congo—*Continued*
Relationships of general structure to gold mineralization in the Kilo area (Woodtli), 584
structure, Kilo area, 587
Content of trace amounts of silver in galena ores from Broken Hill, Australia (Bounsall) (communication), 608
Contact metasomatic copper mineralization at the Calzada Mine, Peru (Stoll) (communication), 612
Conway on potassium in Precambrian, 1042
Cook, A. H. and Gaskell, T. F., review of book by, 1320
Cook, A. H., review of book edited by, 1320
Cook, D. R., on Tintic district, 498
Cooke, H. B. S., review of book by, 227
Cooper on Lindgren's law of equal volumes, 502
Copper, adsorption and absorption of, 1068
-bearing pyrite deposit, Minor elements in a metasomatic zone related to a (Kuroda), 847
comparison of analytical methods used in geochemical prospective for (Huff, Lovering, Lakin, and Myers), 855
concentration by plants, 1066
coprecipitation of, 1068
in rocks, 516
in soils, cold-extractable, 823
lead and zinc in rivers draining Chilean Andes (Degrys), 1456–1464
mineralization at the Calzada Mine, Peru, contact metasomatic (Stoll) (communication), 612
mobility of, 1065
-nickel sulfide deposits of the Siberian platform, problem of genesis of the (review), 448
orebodies, and pyrite body, Cerro de Pasco Mine, Central Peru (Ward), 402
Cerro de Pasco, 417
ores, hydrothermal, 467
organic compounds, 1070
organic sequestration of (Fraser), 1063
organometallic compounds, 1074
partition of, 1073
porphyry breccias, brief outline of a possible origin of (Kents) (communication) 1465–1469
salts, solubility of, 1067
solutions, pH and Eh, 1069
sulfide surface diffusion, 385
vanadium, and uranium deposits in sandstone—their distribution and geochemical cycles (Fischer and Stewart), 509
zinc, and molybdenum content of some limestones and related rocks in Southern Ontario, the lead (Warren, H. V. and Delavault, R. E.), 1265–1272
Coprecipitation of copper, 1068
Core orientation device, a new (Roxström, E.) (communication), 1310–1313

Coronadite, 200
Costal energy levels, Florida panhandle, 1080
Courtright on breccia pipes, 931
on pebble-breccias, 494
on Toquepala, 490
Covellite, 418
from chrysocolla by sulfate reduction, 266
from malachite via copper by sulfate reduction, 265
Crickmay, G. W., on rock ages, 999
Cripple Creek, Colorado, 489
Cresson pipe, 496
Crocidolite from the Koegas-Westerberg area, South Africa.
Part 1. Occurrence (Cilliers), 1421–1429; *Part 2. Mineralogical investigation* (Freeman, Hodgson, Taylor), 1429–1437
Cropper, W. H., on iron solubility, 1413
Crossfolded sediments, 411
Crossfolding, 411
Cryolite, 23
Cryptomelane, 200
Crystal habit and trace element content of some galenas (Marshall and Joensuu), 758
index of, 759
Curie temperature, 1353
Curium^{247}, *Possible geologic relationships in the formation of uranium*^{235} *from* (Adler), 689
Currier, L. W., on fluorite, 554
on replacement, 1438
on "rubble" breccias, 490
CuS and Fe_3O_4 inter diffusion, 372
Cymoid loop, 705
Cymoid loop in vein, 416

Daly on batholiths, 216
on diatremes, 494
Dambos, Northern Rhodesia, 821
Danchev, V. I., et al., abstract of article by, 1157
Danilevskii, V. V., review of book by, 795
Darken on magnetite, 669
Das Sarma on copper analyses, 983
Date, uranium age, 426, 427
Daubrée on synthetic mineralogy, 260
Daumain on Africa, 642
Davidson, C. F., books reviewed, 1481–1483
on blacksands, 437
Davis, J. H., with Cameron, E. N., and Guilbert, J. M., and Larson, L. T., and Mancuso, J. J., and Sorem, R. K., *Rotation properties of certain anisotropic ore minerals*, 569
Davis, R. F., on uraninite and coffinite, 1415
Davis, S. G., *Mineralogy and genesis of the wolframite ore deposits, Needle Hill mine, New Territories, Hong Kong*, 1238–1249
Davis, S. G.—*Continued*
Mineralogy of the Ma On Shan iron mine, Hong Kong, 592
Davidson, C. F., books reviewed by, 1151–54
Russian books reviewed, 794–796
Daw on nickel in Arkansas, 100
Day on Lassen Peak, 96
Dean, B. G. with Granger, H. C., E. S. Santos, Moore, F. B., *Sandstone-type uranium deposits at Ambrosia Lake, New Mexico—an interim report*, 1179–1210
Degrys, A., *Copper, lead and zinc in rivers draining Chilean Andes*, 1456–1464
Dekeyser on glauconites, 1039
de Launay on metallogeny, 1123
Delavault, R. F. with Warren, H. V., *The lead, copper, zinc, and molybdenum content of some limestones and related rocks in Southern Ontario*, 1265–1272
Depositional environment, heavy mineral deposits, 1080
Derry, Duncan R., discussion of article by, 1314
Economic aspects of archaean-proterozoic boundaries, 635
on leucoxene, 1146
Derzay on marcasite and uranium, 255
Description and origin of sulfides in pillow lavas, Mayburn Mines property, Kenora district, Ontario, Canada (Montgomery, H. B.) (communication), 1305–1310
de Senarmont, H., on synthetic mineralogy, 260
Desulphovibrio desulfuricans, 262
Detection of radio-active minerals with infrared aerial photography (Winkler and Voight), 211
Determination of apparent angles of inclined linear elements (Hagen), 204
Deville, Sainte-Claire on volcanic gases, 84
Dewatering tests, 292–294
Diagram, block, Childs-Aldwinkle ore deposit, Arizona, 500
classification of natural radioisotopes, 1393
date relationships, U, Pa^{231}, Th^{230}, 1396
dates of uranium accumulation, 428
equilibrium between sulfides and sulfates, 270
exceptional leads from Ontario, 30
hard hematite, origin of, 1347
isometric, breccia pipe, 495
isometric, cactus ore deposit, Utah, 500
J-lead problem, 27
lead isotope data; errors, 10
lead isotope variations, 12, 13, 14, 18
leucoxene classification, 1145
Ma On Shan ore body, Hong Kong, 598
magnetic measurements, 1353
mineral sequence, Illinois zinc-lead, 142
mineral zones related to solution pH, 720
order of deposition, 545

Diagram—*Continued*
oxidation of goethite, 1059
paragenesis, Central City, Colorado, 1217
paragensis, Central district, N. M., 1371
paragenesis, Lemhi Pass, Idaho, 192
Paragenesis Linchburg orebody, New Mexico, 716
Radial tectonic ore-bodies, 588
reflected compensation, 570
stratigraphy Zuiderzee basin, 1051
system CuS-FeS-ZnS, 1234
X-ray analysis dike, Chibougamau, 328
Diagrammatic section, kilo ava, Congo, 587
Diagrams, composition of sandstones, 513
lead isotopic compositions, 12, 25
remanent magnetization, 1352, 1358
stratigraphic correlation, Elk Ridge, Utah, 118
ternary, isotopic evolution of lead, 7
X-ray patterns of sphalerite, 1221
Diamond on curium, 690
on uranium, 690
"Diatreme," 490, 493
Differential thermal analysis, crocidolite, 1435
Diffusion and volatilization of certain metallic sulfides, experimental investigation of solid (MacDougall, Meikle, Guy-Bray, Saull and Gill), 362
explaining salt content of aquifers, 1048
of sulphides into rock specimens, 373
Digenite from cuprous oxide by sulfate reduction, 266
Discussions—
Barren and productive intrusive porphyry (Greenwood), Stringham, 789
Breccia and pebble columns associated with epigenetic ore deposits (Walker), Bryner, 1149
Chemical characteristics of the ground water resources of Jamaica, W. I. (Hill and Ellington), Versey, 1316
Chemical characteristics of the ground water resources of Jamaica, W. I., a Reply (Hill and Ellington), 1473–1475
Conditions for ilmenite alteration (Lynd), Austin, 994
Constitution of davidite (Butler), J. H. Hayton, 442
Geological periodicals of mainland China (Pow-Foong Fan), listing, 786
Gold-bearing lodes, Kolar, India (Narayanaswany, Ziauddin, and Ramachandra), Borooah and Hazarika, 1472
Intriguing examples of geology applied to industrial minerals (Wheeler, Jr.), Gillson, 618
Iron formations in the southeastern United States (Mann), J. E. O'Rourke, 997
Discussions—Continued
Kolar gold field, India (Pryor), Narayanaswami, Ziauddin and Ramachandra, 995
Kolar gold field, India, (Rao and Sreenivas), Narayanaswami, Ziauddin and Ramachandra, 792
Lead isotopes in ores and rocks of Butte, Montana (Grunig et al.), Murthy and Patterson, 218
Lead isotopes in ores and rocks of Butte, Montana (Murthy and Patterson), Grunig, Guilbert, Zeihen, 216
Leucoxene terminology and genesis (Golding), Lynd, 1138
Ore deposits and sedimentary features in Tennessee (Kendall), Ohle, 1137
Ore deposits and sedimentary features in Tennessee (Ohle), David L. Kendall, 444
Paleozoic banded iron-formations (O'Rourke), Rhoden, 1473
Patterns to ores in layered rocks (Siems), Bain, 790
Postdepositional alteration of sandstone minerals under acidic reducing conditions: a factor in the interpretation of sandstone texture (Holdsworth), 996
Structural history of the Beaverlodge area (Hill), Chamberlain, 614
Disequilibrium, Ambrosia Lake, 1205
Dispersion of anisotropic ore minerals, 577
Disseminated deposits, 420
lead deposit, 397
Distribution of elements in the ores, Ambrosia Lake, 1202
of minor elements in the gonditic manganese ore and its geochemical significance (Mookherjee), 723
of uranium ore deposits in the Elk Ridge area, San Juan County, Utah (Campbell and Lewis), 111
Dobrin, Milton B., review of book by, 625
Dockum group, 516
Dolomite, 161
Domal structure, Ceno de Pasco, 412
D'OR on pyrite, 668
Dreyer, R. M. on exothermic reactions, 554
on replacement, 1439
Drew on lime deposition, 261
Druses, 494
Dutch polderland, source of brackish ground water in Pleistocene formations beneath the (Volker), 1045
Dyadchenko on glauconites, 1038
Dymkov, Y. M., book by reviewed, 1482

Economic aspects of archaean-proterozoic boundaries (Derry), 635
Economic aspects of archaean-proterozoic boundaries (Osborne, F. F.) (discussion), 1314–1316
Economic geology, Mattagami Lake, Orchan, Quebec, 750

Egypt, copper deposits, Sinai, 560
economic uranium deposits, 566
Iron ore deposits of El-Bahariya Oasis (Hakhla), 1103
lead-zinc mineralization, 563
manganese-iron deposits, Sinai, 561
Olipocene lava, 557
pyrite replacements, 560
radioactivity, 559
and tertiary volcanic activity in (Gindy), 557
in monazite, zircon, and "radioactive black" grains in blacksands of Rosetta (Gindy), 436
tertiary dolomite deposits, 559
Einor, O. L., review of book by, 148
Electrodialysis cell, 199
observations on cation exchange in some manganese minerals by (Screenivas and Roy), 198
Eliseev, N. A., review of book by, 795
Ellington, A. C., communication, 982
with Hill, V. G., *Chemical characteristics of the ground water resources of Jamaica, W.I.*, 533
discussion of article by, 1316–1317
reply to discussion, 1473–1475
Emanations change by reaction, 93
reaction with wall rocks, 95
on Bassick mine, Colorado, 496
on breccia pipes, 492
on zoning, 132
Echelon breaks, New Mexico, 703
Enargite, 414, 415, 418
Engel quartz veins, 103
Entrada sandstone, 514
Epidote, 185
group, 324
Epigenetic ore deposits, breccia and pebble columns associated with (Bryner), 488
Equilibria in sulfur-containing aqueous solutions, in the system Fe-S-O, and their correlation during ore deposition (Barnes and Kullerud), 648
Equilibrium constants, calculations of, 651 ff
problem of, Central City, Colorado, 1219
Euxenite, 187
-polycrase, 442
Evensen on solution migration, 127
Everhart on sulfides, 251
on uranium, copper and vanadium, 516
Experimental investigation of solid diffusion and volatilization of certain metallic sulfides (MacDougall, Meikle, Guy-Bray, Saull, and Gill), 362
models, magma solidification of, 73
Ex-solution, 468

Fairbairn, H. W., on Sudbury, 498
Faris on Egyptian iron, 1103
Farmin on pebble dikes, 932
Faulting, archaean rocks, Canada, 913
Faults, Ambrosia Lake district, New Mexico, 1186
at Cerro de Pasco, 413
Feldspar, 61, 189
at Chibougamau, 328
Ferroselite, 1200
Ferrous sulfide from metallic iron by sulfate reduction, 264
Figure, breccia pipe fragments, 929
Craelius core orientation device, 1310
drawing of thin section of leucoxenic sand grain, 1143
sample points, Jamaican bauxite, 1298
Filimonova, A. A., review of book by, 622
Finch, Warren I., on uranium, 512
Finnell on origin of uranium ore, 127
Fischer, Richard P., and Stewart, John H., *Copper, vanadium, and uranium deposits in sandstone—their distribution and geochemical cycles*, 509
Fissure and fault fillings, Egypt, 560
Fleischer on galena, 768
on manganese minerals, 198
on silicate melts, 82
Fletcher, J. D., on sphalerite, 1367
Flin Flon mine, analysis of pyrites, 472
Flinter, B. H., on leucoxene, 1144
Florida panhandle, Possible masked heavy mineral deposit (Tanner, Mullins, Bates), 1079
Fluid inclusions, 468
aqueous, 547
chemical composition of, 87 ff
petroliferous, 547
types of, 547
Fluidization, 494
Fluorite, 545
replacements, origin, 736
Fluoritic sandstone, Wet Mountains, Colorado, occurrence of radioactive, (Boyer), 780
Fluorspar, temperatures of mineralization by liquid inclusions, Cave-in-Rock district, Illinois (Freas), 542
Utah, 943
Folding, archaean rocks, Canada, 912
Folds, 705
Cerro de Pasco, 412
Forman on quartz, 245
Formation of vein systems at Cerro de Pasco, 416
Forsman, J. P., on Kerogen, 1195
Foster on montmorillonites, 1037
Franklinite, 200
Fraser, D. C., *Organic sequestration of copper*, 1063
Freas, Donald H., *Temperatures of mineralization by liquid inclusions, Cave-in-Rock fluorspar district, Illinois*, 542
Freeman, A. G., Hodgson, A., and Taylor, H. F. W., *Crocidolite from the Koegas-Westerberg area, South Africa. Part 2. Mineralization investigation*, 1429–1437
Freibergite, 418

Friedlander on radioactive daughters, 426
Friedrich K. and Benningson, F., on system Ni-As, 1287
Frondel on pitchblende, 256
Fryklund, V. C. on sphalerite, 1367
Fugacity, 650
Fumaroles, chemical composition, 84 ff
Egypt, 559
Furnace, sketch, 365
Furon, R., on Africa, 642
Furcron, A. S., on iron formation, 999

Gableman on fluorite, 731
Galena, 18, 20, 21, 24, 29, 31, 61, 94, 95, 133–135, 139, 143, 398, 399, 414, 415, 706
by sulfate reduction, 267
from Karelia, 23
from Ivigtut, 23
from Outokumpu, 23
ores from Broken Hill, Australia, content of tract amounts of silver in, (Bounsall) (communication), 608
crystal habit and trace element content of some (Marshall and Joensuu), 758
Garnet, 706
Garnierite, 106
Garrels on exothermic reactions, 554
on replacement, 1439
on ore solutions, 147, 148
on uranium, copper, and vanadium, 516
on uranium solubility, 1413
Gaskell, T. F., review of book edited by, 1320
Gaskell, T. F., with Cook, A. H., review of book by, 1320
Gastil on Archaean, 638
on iron formation, 640
on Proterozoic, 638
Gay, Thomas E., Jr., review of maps by, 1154
Geiger counter, examination with, 1256
Genesis and control of the Linchburg ore body Socorro County, New Mexico (Titley), 695
glauconite, 1038
of the wolframite ore deposits, Needle Hill mine, New Territories, Hong Kong (Davis, S. G.), 1238–1249
pumaceous perlitic rhyolite, Hungary, 1115
Genetic implications, some, of lead isotope studies, 17
Genkin, A. D., et al., abstract of article by, 1159
on arsenopyrite, 157
"on metacrysts," 174
Geochemical considerations, Linchburg Mine, New Mexico, 717
cycles of uranium, copper and vanadium, 516
interpretation, minor elements in gondites, 726
Geochemical considerations—*Continued*
prospecting
analytical methods, 859
background metal content & soils, 823
Biquinoline copper test, 860
Chili, 1456–1464
chromographic copper test, 860
citrate soluble heavy metal test, 859
cobalt in soil, distribution of, 841
comparison of analytical methods, 864
contamination influence on soil sampling, 842
copper anomalies in soils related to ore, Nothern Rhodesian Copperbelt, 825 ff
dithizone copper test, 860
for copper, comparison of analytical methods used in (Huff, Lovering, Lakin, and Myers) 855
for nickel in the Blue Mountain area, Jamaica, W.I. (Hill), 1025
investigations in the Northern Rhodesian Copperbelt (Tooms and Webb), 815
spot test for nickel, 1030
grade of ore, influence on soil anomalies, 839
heavy metal test, 860
Kenora district, Ontario, 1307
lithology, influence on soil anomalies, 839
mode of dispersion of soil anomalies, 840
soil type, influence on soil anomalies, 832
spectrographic analysis, 861
topography, influence on soil anomalies, 832
sampling, statistical analysis, 1029
Geochemistry, curium, 690
of sphalerite, Central City district, Colorado, some aspects of (Sims and Barton), 1211–1237
of uranium deposits in sandstone above, at, and below the water table. Part I. Calculation of apparent dates of uranium migration in deposits above and at the water table (Rosholt), 1392–1403; *Part II. Relationship of uranium migration dates, geology, and chemistry of the uranium deposits* (Robinson and Rosholt), 1404–1420
Geography—Ambrosia Lake district, New Mexico, 1183
Geologic formations, Spor Mtn., Utah, 942
Lemhi pass, Idaho, 178
map, Albanel iron range, Quebec, 304
Bannockburn Basin area, B.C., 395
Cerro de Pasco area, Peru, 405
Elk Ridge, Utah uranium deposits, 114
Ma On Shan iron mine, 599
Needle Hill district, New Territories, Hong Kong, 1241
Neyveli lignite area, 275
nickeliferous dike, 102

Geologic formations—*Continued*
southern India lignite area, 274
Tipuani gold placers, Bolivia, 1261
plan, Cerro de Pasco, 411
Cerro de Pasco mine, 408
thermometry, 542
setting, Moto gold field, Congo, 603
Geology, Albanel area, Quebec, 301
Ambrosia Lake district, New Mexico, 1185
and ore deposits of the Mattagami area, Quebec (Jenney), 740
and origin of mineralized breccia pipes in Copper Basin, Arizona (Johnston and Lowell), 916
asbestos, South Africa, 121
Central City district, Colorado, 1211–1237
Cerro de Pasco area, 404
Chibougamau district, Quebec, 321
Clarendon Plains, B.W.I., 534
general, Copper Basin area, Arizona, 919
Michipicoten area, Ontario, 899
Northern Rhodesian Copperbelt, 817
Superior-Timiskaming region, 907
Hauber mine, Crook County, Wyoming, 424
Hitachi mine, Japan, 848
Hulett Creek, Wyo., 1406
Kilo gold fields, Congo, 585
Maybrun mines, Ontario, 1305
map, Big Indian Mn deposit, California, 52
Fort Gouraud iron deposits, Mouritania, 1357
Needle Hill, Hong Kong, 1242
Neyveli lignite deposits, India, 278
of Cleora Mining district gypsum deposits, Wellsville area, Colorado (Reeves, Jr.), 772
of ore northwest Illinois lead-zinc district
of the Temiscamie iron-formation, Lake Albanel iron range, Mistassini territory, Quebec, Canada (Quirke), 299
Ma On Shan mine, Hong Kong, 595
Geophysical prospecting, Kenora district, Ontario, 1309
Geothermometry, by sphalerite Fe content, 1363
Geysers, length of life, 73
Gheith on Egyptian iron, 1103
on magnetite, 964
Gill, J. E., with MacDougall, J. F., and Meikle, B. K., and Guy-Bray, J. V., and Saull, V. A., *Experimental investigation of solid diffusion and volatilization of certain metallic sulfides*, 362
Gill on Proterozoic, 636
Gillerman, E., on replacement, 1438
Gindy, Amin R., *Radioactivity and tertiary volcanic activity in Egypt*, 557
Radioactivity in monazite, zircon, and "radioactive black" grains in blacksands of Rosetta, Egypt, 436
Ginzburg, A. I., review of book by, 620
review of book by, 1482
Glagoleva on copper, 517
on vanadium, 518
Glauconite, genesis of, 1038
in the Biwabic iron-formation of Minnesota, secondary (Tyler and Bailey), 1033
structural formulas, 1036
Goddard on Cripple Creek, 496
Godlevsky, M. N. review of book by, 448
Goethite, studies on the oxidation (Gokhale), 1058
Gokhale, K. V. G. K., *Studies on the oxidation of goethite*, 1058
Studies on the oxidation of magnetite, 963
Gold, 22, 24
associated with carbonate-albite-quartz schist, 607
bearing conglomerates, lead isotopes in, 24
deposits at Tipuani, Bolivia, tertiary channel (Stoll, W. C.), 1258–1264
quartz veins, 589
impregnation deposits in the Moto area (Central Africa) (Woodtli), 603
in Archaean, 636
mineralization in the Kilo area (Central Africa), relationships of general structure to (Woodtli), 584
Moto area, Congo, no structural control, 606
ores, pyritic, 467
placers, Peru, 987
Goldfields, Sask., pitchblend veins, lead isotopes in, 24
Goldich, S. S., on Animikie rocks, 638
Goldich, Samuel S., et al., review of book by, 1162
Golding, H. G., discussion by, 1138
Goldschmidt on galena, 758
on uranium, copper and vanadium, 516
Goliad sand, 514
Goodwin, A. M. *Aspects of Archaean structure and mineralization*, 897
Gondites metamorphosed manganese sediments, 723
Goranson on silicate melts, 79
Gordon on bauxite, 977
on Magdalena district, 705
Gorzheusky, D. I., review of book by, 621
Granger, H. C., Santos, E. S., Dean, B. G., and Moore, F. B., *Sandstone-type uranium deposits at Ambrosia Lake, New Mexico—an interim report*, 1179–1210
Granite to sediments, relation, Michipicoten area, Ont., 905
Granitized rocks in Archaean, 636
Graph, accuracy geochemical prospecting tests, 869
acidity and oxidation state of ore solutions, 682

Graph—*Continued*
and section, geochemical prospective tests, 858
antimony concentration vs. index of crystal habit for galenas, 763
aqueous solution, pyrite, pyrrhotite, and magnetite, 680
atomic ratios, Huiett Creek, Wyo., 1410
calculation of diffusion of salt, 1053
cation replacement reactions, 1020
chloride concentrations ground water, 1048
chloride concentrations in Netherlands, 1055
comparison of equilibrium constants, 653
concentration of copper over ore, 1308
conductivity of water samples, 536
current flow in dialysis cell, 199
determine apparent angles, 206
dispersion of minerals, 576
distribution of aqueous species, 661, 662, 663
element distribution, 1203, 1204
equilibrium of aqueous species, 660
equilibrium relations, 677
FeSo in sphalerite, down dip, 1381
near stocks, 1377
hardness curves for magnetite, 966
ionic activity product of water, 665
isotopic relationships, earth's crust, 4
lead isotopes at Butte, 63
mineral size decreases with distance, 1252
Mn and Fe in sphalerite, 1235
nickel values, 1030
along a traverse, 984
Pb/Zn ratios, Central district, N. M., 1370
phosphorus and iron in gondite ore, 727
potassium breakthrough curve for clinoptilolite, 1134–1135
precision geochemical prospecting tests, 867
P-T curve, pyrite, pyrrhotite, magnetite plus vapor, 674
radioactive equilibrium, Ambrosia Lake, 1206, 1207
radioactivity mineral grains, 440
monazite grains, 438
zircon grains, 439
replacement reactions, 1442
scatter diagram, geochemical prospecting tests, 865, 868
solvus, system ZnS-FeS, 1365
spectrographic curves, 471
sphalerite equilibrium, 1226
in Equilibrium, 1222
temperature in furnace, 365
time relationships, Pa^{231} and Th^{230} to U, 1397, 1398
vapor pressure sulfur, 668
variation diagram, Michipicoten volcanics and stocks, 904
variation diagram, minor and major elements in rocks, 850–852
Graph—*Continued*
variation in niccolite, 1285
variation of interlayer cations in glauconites, 1037
of the cell edge of magnetite, 967
with depth bauxite, 977
Graphs, anion replacement reactions, 523–25, 528, 530
calcite replacement by fluorite data, 735
chloride concentration in ground water, 1050
conductivity water, 537
copper and cobalt in soils, 826, 827, 828, 830, 831, 833, 834, 835, 836, 841, 842, 843
equilibrium relations between aqueous ions and molecules, 658–659
frequency distribution of copper assays, 862
phase relations in the Fe-S-O, 672
relation of water level to withdrawal, 296
water loss rhyolite varieties, 1119
Graphic determination of apparent angle, 208
Grass Valley, California, 87
Graywacke in Archaean, 636
Greenwood, Robert, discussion by, 790
Gregory on sources of ore-lead, 17
Grenville age, 1315
front, 640, 1314
series, 1314
sub-province, 1314
Grieg et al., on magnetite, 964
Griffitts, Wallace R., with Staatz, Mortimer H., *Beryllium-bearing tuff in the Thomas Range, Juab County, Utah*, 941
Grigor'ev, A. A., review of book edited by, 1153
Grogan on fluid inclusions, 543
Grogan, R. M., on replacement, 1438
Gross, W. H. and Strangway, D. W., *Remanent magnetism and the origin of hard hematites in Precambrian banded iron formation*, 1345–1362
Ground-water conditions, Neyveli lignite area, India, 286
control for mining lignite, 297
in the Neyveli lignite field, South Arcot district, Madras State, India (Jones and Subramanyan), 273
discharge, 290
in Pleistocene formations beneath the Dutch polderland, source of brackish (Volker), 1045
Jamaica, reply to discussion, 1473
movement, 289
resources of Jamaica, W.I., chemical characteristic of the (Hill and Ellington), 533
Grout on batholiths, 216
Growth lines, 547
Gruner, J. W., on leucoxene, 1147
on magnetite, 964
on manganese exchange, 198

Gruner, J. W.—*Continued*
on muscovite, 252
on sulfide solutions, 719
on uranium, copper and vanadium, 516
Grunig, James K. discussion by, 216
Guano, Peru, 986
Guilbert, John M., discussion by, 216
Guide to ore, rock color, 1193
Guilbert, J. M., with Cameron, E. N., and Davis, J. H., and Larson, L. T., and Mancuso, J. J., and Sorem, R. K., *Rotation properties of certain anisotropic ore minerals*, 569
Gummite, 251
Gunning on Bannockburn, B. C., 400, 401
on British Columbia, 393
Gurry on magnetite, 669
Guy-Bray, J. V., experiments on sulfide diffusion, 383
Guy-Bray, J. V., with MacDougall, J. F., and Meikle, B. K. and Saull, V. A., and Gill, J. E., *Experimental investigation of solid diffusion & volatilization of certain metallic sulfides*, 362
Gypsum, 521, 526
deposits, Wellsville area, Colorado, geology of Cleora Mining district (Reeves, Jr.), 772

Habits of uranium, vanadium and copper deposits, 510
Hack on diatremes, 493, 494
Hagen, John C., Determination of apparent angles of inclined linear elements, 204
Hague, Arnold, Yellowstone geysers, 74
Hamilton, G. N. G., review of book by, 227
Harder on bauxite, 972
Harrison, J. M. on Proterozoic, 636
on bauxite, 979
Hartman on crystal forms, 769
Hawaii, Kilauea, 86
Hawkes on copper precipitation, 1068
Hawley, J. E., and Nichol, Ian, *Trace elements in pyrite, pyrrholite and chalcopyrite of different ores*, 467
Hawley, J. E. on diffusion, 363
Hayton, J. D. on davidite, 442
Heavy mineral deposit, Florida panhandle, possible masked (Tanner, Mullins, Bates), 1079
quantities, Apalachicola delta, 1083
suites, Apalachicola delta, 1082
Heavy minerals, concentrating, 1251
determination of, 1253
from river sands, prospecting for ore deposits by panning (Zeschke, G.), 1250–1257
transportation of, by rivers, 1251
Hebergite, 251
Hem, J. D., on iron solubility, 1413
Hematite, 307, 310, 318, 671, 706
ore, concentration processes, 1346
Hematites in Precambrian banded iron formation, remanent magnetism and the origin of hard (Gross and Strangway), 1345–1362
Hemimorphite, 564
Heron on India, 643
Hetaerolite, 200
Hewett, D. F., Chesterman, C. W., and Troxel, B. W., *Tephroite in California manganese deposits*, 39
Hewitt, D. F., on niccolite, 1276
Heyding, R. D. and Calvert, L. D., on $NiAs_2$, 1277
on $Ni_{2-x}As_2$, 1275
on niccolite, 1276
Higazy on uranium in Egypt, 566
Hill, M. J., on wrench faults, 414
Hill, Patrick Arthur, discussion by, 614
Hill, V. G., and Ellington, A. C., *Chemical characteristics of the ground water resources of Jamaica, W.I.*, 533
discussion of article by, 1316–1317
Hill, V. G., communication, 982
geochemical prospecting for nickel in the Blue Mountain area, Jamaica, W.I., 1025
reply to discussion, 1473–1475
Hilpert, L. S., on Ambrosia Lake district, New Mexico, 1190
on folding, 1186
Histogram, river sediments, Chili, 1458
History, gold mining eastern Bolivia, 1258
Lemhi pass, Idaho, 179
Ma On Shan mine. 595
of mining, Ambrosia Lake district, 1187
of term metallogeny, 1123
tungsten mining in Hong Kong, 1239
Hobbs on calcite, 136
on galena, 135
Hodgson, A., with Freeman, A. G., and Taylor, H. F. W., *Crocidolite from the Koegas-Westerberg area, South Africa. Part 2. Mineralogical investigation*, 1429–1437
Hok, Tan Tek, on sulfur deposits, 261
Holland, *Source of brackish ground water in pleistocene formations beneath the Dutch polderland* (Volker), 1045
Hollandite, 200
Holmes, A., on India, 643
on metallogeny, 1123
on sources of ore-lead, 17
Holmes, R. J., on $NiAs_2$, 1277
Hong Kong, mineralogy and genesis of the wolframite ore deposits, Needle Hill mine, New Territories (Davis, S. G.), 1238–1249
mineralogy of the Ma On Shan iron mine (Davis), 592
Horsetail deposits, 420
Howland on exothermic reactions, 554
Hsiao on sulfides, 383
Hudson, on manganese carbonate, 42, 43
on manganese deposits, 42

Huff, L. C., Lovering, T. G., Lakin, H. W., and Myers, A. T., *Comparison of analytical methods used in geochemical prospecting for copper*, 855
Hugget on magnetite, 964
Hulin on chonoliths, 932
on Rand schist, 53
Hume on Egyptian iron, 1103
Hungary, Pumice and perlite in a rhyolite complex in (Otvos, Jr.), 1112
Hunt, R. N., on Bingham, 501
Hunt, C. B., on intrusive ages, 112
on kerogen, 1195
Hurley et al. on rock ages, 692, 1042
Hurley on glauconite, 1039
Huzarika, U. C., discussion, 1472
Hydraulic tests, 291
Hydrothermal, 510
activities, Egypt, tertiary, 559
mineralizing effects, 558
alteration, 567
copper ores, 467
solutions change by reaction, 90
Egypt, 566
Hydrozincite, 1257
Hypogene, 510
copper orebodies, Cerro de Pasco, 420
minerals, 418
Holdsworth, B. K., discussion, 997

Ibrahim on Tertiary tectonics, 1109
Iceland, geysers, 74
Idaho, origin of the thorite deposits, Lemhi pass, 195
thorite deposits, Lemhi pass, size and tenor of deposits, 193
thorium mineralization in the Lemhi pass area, Lemhi County (Anderson), 177
Igneous intrusion, asbestos beds, 1425
rocks, Linchburg mine, New Mexico, 701
Illinois, cave-in-rock, 543
Deardorff mine, 544
northwestern zinc-lead district, mineralogy and the question of zoning (Bradbury), 132
Renault formation, 543
St. Genevieve formation, 543
temperatures of mineralization by liquid inclusions, cave-in-rock fluorspar district (Freas), 542
Victory mines, 544
zinc-lead district, spectrographic analyses of minerals, 136
Ilsemannite, 1200
Inclusions, 468
Index of crystal habit, 759
India, Eastern Ghats, 643
ground-water control in the Neyveli lignite field, South Arcot district, Madras State (Jones and Subramanyam), 273
Kolar gold fields, discussion, 1472
Mysore nucleus, 643
India—*Continued*
Precambrian, mineral deposit, 643
nuclei, 643
Satpura tectonic province, 643
Singhbhoum area, 643
stratigraphy, Negveli lignite, 278
structure, Negveli, lignite area, 285
upper Dharwars, 643
Zawar mine, 644
Infrared aerial photography, the detection of radio-active minerals with (Winkler and Voight), 211
Ingerson on magmatic emanations, 93
Intrusives, Linchburg mine, New Mexico, 702
Mattagami area, Quebec, 746
Inyan Kara group, 514
Ion exchange experiments, 521–532
Ionic and molecular species, aqueous, 651
Iron content of sphalerite from the Central district, New Mexico and the Bingham district, Utah, the (Rose), 1363–1384
formation in Proterozoic, 639
-formation, Lake Albanel iron range, Mistassini territory, Quebec, Canada, geology of the Temiscamie (Quirke), 299
paleozoic banded (discussion), 1473
temiscamie stratigraphy, 303
mine, Hong Kong, mineralogy of the Ma On Shan (Davis), 592
ore deposits of El-Bahariya Oasis, Egypt (Nakhla), 1103
resources of the North-Eastern Congo (Woodtli), 1385–1391
sulfide volatilization, 385
Irving, J. D., on replacement, 1438
Isachsen on solution migration, 127
Isotope geology related to problems of ore genesis, the data of lead (Cannon, Pierce, Antweiler and Buch), 1
Isotopic composition of lead in ores and rocks, 11–13
variations of ore-lead, some, 13
Ivanitsky, T. V., abstract of article by, 1160
Ivanov, A. A., review of book by, 226
Ivanov, V. V., review of book by, 1152
on volcanic gases, 85
Ivigtut, galenas from, 23
Izett, G. A., on uraninite and coffinite, 1415

Jackson group, 514
Jaeger on heat flow, 70–73
Jahns, Richard H., book review, 1156
Jamaica, Some chemical aspects of bauxite genesis in (Burns, D. J.), 1297–1303
chemical characteristics of the ground water resources of (Hill and Ellington), 533
geochemical prospecting for nickel in the Blue Mountain area (Hill), 1025
James on glauconite, 1041
Japan, Hitachi mine, geology, 847
Jaspilite, 1387

Jenks, W. F. on Cerro de Pasco, 413
on stratigraphy Peru, 404
Jennings, Charles W., review of maps by, 1154
Jenny, C. P., *Geology and ore deposits of the Mattagami area*, Quebec, 740
Jensen on origin uranium deposits, 129
Jigging, 1251
Jobin, D. R., on transmissivity, 121, 122
Joensuu, Oiva, with Marshall, Royal R., *Crystal habit and trace element content of some galenas*, 758
Johnson, H. S., Jr., on sandstone lenses, 120
Johnson, R. E., on Cerro de Pasco, 412
Johnston, W. P., and Lowell, J. David, *Geology and origin of mineralized breccia pipes in Copper Basin, Arizona*, 916
Jones, Paul H. and Subramanyam, V., *Ground-water control in the Neyveli lignite field, South Arcot district, Madras State, India*, 273
Joplin, Mo., "J" type lead
Joralemon on breccia pipes, 934
on chimneys, 492
Jordisite, 1200
Juza on sulfur-sulfide system, 261

Kalinichenko on copper, 982
Kalliokoski, J., *Temperatures of formation and origin of the Nigadoo and Brunswick Mining and Smelting No. 6 deposits, New Brunswick, Canada*, 1445–1455
Kaplan, J. R., on bacteria, 262
Karelia, galenas from, 23
Karpou, R. U., abstract of article by, 1004
Katz on protactinium and thorium, 425
Kazitsyn, Yu. V., abstract of article by, 1004
Keewatin age, 1315
Keller on glauconite, 1041
on weathering, 980
Kendall, David L., discussion, 1138
on Jefferson City, Tenn., 444
Kennedy on basaltic melts, 80
on fluid inclusions, 553
on radioactive daughters, 426
Kenora district, Ontario, Canada, Description and origin of sulfides in pillow lavas, Maybrun Mines property (Montgomery, H. B.) (communication), 1305–1310
Kents, P., Brief outline of a possible origin of copper porphyry breccias (communication), 1465–1469
Kerr, P., on anatase, 1201
on adularia, 252
on marcasite, 256
Kerr, Paul F., with Barrington, Jonathan, *Uranium mineralization at the Midnite Mine, Spokane, Washington*, 241
Khatuntzeva on glauconites, 1038
Khrushchov, N. A., abstract of article by, 1158
Kildale on pebble dikes, 498
Kimberly, 489
Kimble, George H. T., review of book by, 624
King, C. A. M., review of book by, 802
Klagish, B. D., review of book by, 450
Knopf on Butte, 215
Knowles on iron formation, 640
on Proterozoic, 638
Komarova, G. N., review of book by, 451
Konstantinov, M. M., review of book by, 227
Kopp on marcasite, 256
Korolev, A. V., review of article by, 1002
Koschmann on Cripple Creek, 496
on Magdalena district, 698
Koutek on Slovakian deposits, 152
Krauskopf on fumaroles, 87
on uranium, copper, and vanadium, 516
Krishnan, M. S., ed., review of book edited by, 1320
on India, 643
Krishtofich, A. N., review of book by, 1153
Kuhn on breccia, 500
on breccia pipes, 932
on Copper Creek, Arizona, 499
on pipe deposits, 932
Kulikova, E. Ya., review of book by, 227
Kullerud, Gunnar, on sphalerite, 1225, 1365
on sulfides, 1226
on vapor pressure, 666
Kullerud, G., with Barnes, H. L., *Equilibria in sulfur-containing aqueous solutions, in the system Fe-S-O, and their correlation during ore deposition*, 648
Kuroda, Yoshimasu, *Minor elements in a metasomatic zone related to a copper-bearing pyrite deposit*, 847
Kutina, J., and Sedláčková, J., *The role of replacement in the origin of some cockade textures*, 149
Kutina, J., on mineral boundaries, 157
on trace elements, 138

Lacy, W. C., on "breccia pipe," 490
on Cerro de Pasco, 410
on "shatter pipes," 490
Laffitte, Pierre on hydrothermal alteration, 90
Lake Mistassini, 640
Lakin, H. W., with Huff, L. C., and Lovering, T. G., and Myers, A. T., *Comparison of analytical methods used in geochemical prospecting for copper*, 855
Lang, A. H., *Metallogenic maps*, 1123
Larsen, E. S., on Sierra Nevada batholith, 69
Larson age, 62
Larson, L. T., on polishing effects, 579

Larson, L. T., with Cameron, E. N., and Davis, J. H., and Guilbert, J. M., and Mancuso, J. J., and Sorem, R. K., *Rotation properties of certain anisotropic ore minerals*, 569
Late pleistocene and recent accumulation of uranium in ground water saturated sandstone deposits (Rosholt, Jr.), 423
Laurentides plutonites, 1314
Laves, F., on maucherite, 1275
Laylander on infrared film, 211
Lazarenko, E. K., review of book by, 226
Lead, Brown on sources of ore-lead, 17
copper, zinc, and molybdenum content of some limestones and related rocks in Southern Ontario (Warren, H. V. and Delavault, R. E.), 1265–1272
deposits, mineralization, chronology of, 21
mineralization, processes of, 22
Gregory on sources of ore-lead, 17
Holmes on sources of ore-lead, 17
hypothetical evolution of, in the earth, 3–11
in chalcopyrite, 481
in Mississippi Valley lead-zinc deposits, 26
in pyrite, 476
in pyrrhotites, 479
in sulfides, 483
orderly evolution of ore-lead, 17
in ores and rocks, isotopic composition of, 11–13
isotope data, application to prospecting, 29
geology related to problems of ore genesis, The Data of (Cannon, Pierce, Antweiler and Buck), 1
studies, mineral separation in, 61
isotopes, Atlantic City, Wyoming, 31
in Adirondacks, 16
in Broken Hill, 16
in conglomerates, 24
Cañon Diablo meteorite, 4
Coeur d'Alene, 30
in Iviptut, 23
in Karelia, 23
measurement errors, 9–11
Metaline district, Wash., 20
meteorites, 4
in ores and rocks of Butte, Montana (Murthy and Patterson), 59
in Outokumpu, 23
in Park Range, Colorado, 16
in pitch blend veins, Goldfields, Sask., 24
in Sudbury, Ont., 16
in sandstone-type deposits (Colorado Plateau), 24
in uraninite vein, Coeur d'Alene, 24
in uraninite veins in Dripping Spring quartzite, Arizona, 24
variations by district, 16
Lead—*Continued*
variations by province, 15
in Yavapai Co., Arizona, 16
"J" type, 24
some isotopic variations of ore-lead, 13
sources of ore-lead, 19
sulfide volatility, 384
"Th" type, 23
"U" type, 23
zinc and copper in rivers draining Chilean Andes (Degrys), 1456–1464
-zinc replacement bodies, 412
veins, 412, 416
Lebedev, L. M., review of book by, 622
Lepp on magnetite, 964
Leptothermal range, 564
Levitskii, Yu F., review of book by, 226
Levorsen, A. I., review of book by, 623
Lewis, R. Q., on origin uranium ore, 127
Lewis, Richard Q., with Campbell, Russell H., *Distribution of uranium ore deposits in the Elk Ridge area, San Juan County, Utah*, 111
Lignite field, South Arcot district, Madras State, India, ground-water control in the Neyveli (Jones and Subramanyam), 273
Limonite, 94, 134
Linchburg mine, 698
fault, 703
Linder on sulfide solutions, 719
Lindgren, W., on colloform structure, 255
on colloids, 255
Waldemar on epigenetic ore, 216
on fluid inclusions, 87
on law of equal volumes, 503
on metasomatism, 696
on "minerogenetic," 1124
on Morenci, 717
on sulfide paragenesis, 96
on epigenetic ore, 216
Liquid inclusions, cave-in-rock fluorspar district, Illinois, temperatures of mineralization by (Freas), 542
Liquidus-solidus relations, system Ni-As, 1287
Lithologic units, Moto gold field, Congo, 604
Lithiophorite, 200
Ljunggren on bog iron, 1110
Localization, factors controlling uranium deposits, 128
of ore, at vein splits, 415
by bedding plane faults, 613
by breccia pipes, 488–508
by chemistry lithology structure, 419
by crossfolding, 411
by domes by archs by warps in bedding, 445
by faults, 544
by lava pillows, 1306
by microbreccia, 407
by pre-existing rock textures & structure, 409
by sedimentary features, 444, 510

Localization—*Continued*
by structure stratigraphy and mineralogy, 711
by vein break up, 412
by vein intersections, 1214
controls affective, Cerro de Pasco, 421
crest of drag fold, 401
no structural or lithologic control, 606
normal fault, 416
on Antidine, 398
on footwall splits of veins, 414
on hanging wall of fault, 400
on minor flexures, 749
Locke, A., on Bingham Canyon, 497
on breccia pipe, 499
on "mineralization stoping," 502
on pipe deposits, 932
Loughlin on Cripple Creek, 496
on Magdalena district, 698
Lovering, T. G., with Huff, L. C., and Lakin, H. W., and Myers, A. T., *Comparison of analytical methods used in geochemical prospecting for copper*, 855
Lovering, T. S., on breccia pipes, 932
on copper precipitation by bacteria, 1071
on Cripple Creek, 496
on pebble dikes, 932
sulfide ores formed from sulfide-deficient solutions, 68
Lowell, J. David, with Johnston, W. P., *Geology and origin of mineralized breccia pipes in Copper Basin, Arizona*, 916
Lukin, L. I., review of book by, 1152
Luzonik, 416, 418
Lynd, Langtry E., discussion, 994
discussion of article by, 1138
Lydon, Philip A., review of maps by, 1154

MacDougall, J. F., Meikle, B. K., Guy-Bray, J. V., Saull, V. A., and Gill, J. E., *Experimental investigation of solid diffusion and volatilization of certain metallic sulfides*, 362
MacDougall's experiments on sulfides, 363
Mackay on localization of uranium deposits, 128
Maclaren on metallogenic province concept, 1124
Magakyan on metallogenic maps, 1129
Magma, 79
crystallization of, 70–73
heat flow equations, 70
latent heat of fusion, 70
plane of solidification, 70–73
solidification of, experimental models, 73
volatiles from, 69–76
Magmatic emanations, 76
nickel ores, 467
-pegmatitic-hydrothermal sequence at Lacorne, Quebec (Brett), 784
Magnetic and soil data, Copper Basin district, Arizona, 938
stability, tests of, 1352
Magnetism in iron formations, 1353
remanent, types of, 1349
Magnetite, 188, 307, 310, 311, 314, 317, 318, 599, 671, 706
nickel in, 1031
oxidation, petrographic significance, 970
studies on the oxidation of (Gokhale), 963
Maksenkov, V. G., review of book by, 620
Malachite, 418, 561
Malan on marcasite and uranium, 255
Mancuso, J. J., with Cameron, E. N., and Davis, J. H., and Guilbert, J. M., and Larson, L. T., and Sorem, R. K., *Rotation properties of certain anisotropic ore minerals*, 569
Manganese deposits in California, 42
Tephroite in California (Hewett, Chesterman, and Troxel), 39
Minerals by electrodialysis, observations on cation exchange in some (Sreenivas and Roy), 198
dialysed, 200
ore and its geochemical significance, distribution of minor elements in the gonditic (Mookherjee), 723
sediments, gondites metamorphosed, 723
sulfide volatilization, 385
Manitoba, Sherritt Gordon, 641
Thompson Lake, 641
Manitovwadge (Geco) mine, analysis of pyrites, 472
Mann, Virgil I., discussion, 1000
on titania solution, 1146
Mantos, 606
Map, Africa, N-E Congo iron, 1386
Ambrosia Lake district, New Mexico, 1181
Map and section, B. M. and S. No. 6 sphalerite deposit, 1451
Apalachicola River delta, 1081
bauxite deposits, West Sarawak, 973
breccia pipe area, Copper Basin, Arizona, 926
cave-in-rock, Illinois, 544
Central City district, Colorado, 1215
Central district, New Mexico, 1369
Chibougamau district, 322
Clarendon plains, Jamaica, B. W. I., 534
Colorado, 780
Copper Basin mining district, Arizona, 920
copperbelt, Northern Rhodesia, 817
deposits, Spor Mtn., Utah, 944
distribution of scheelite in the Manshera-Domel area, Pakistan, 1256
Egypt, 558
geochemical anomalies, Chili, 1459–1461
geologic, Hitachi district, Japan, 848
Hogsback deposit, Utah
geology and structure, Michipicoten area, 901

Map—*Continued*
Superior-Timiskaming region, 908
geology of Mattagami area, Quebec, 742
heavy mineral distribution, Apalachicola delta, 1084
hematite orebody, Fort Gouraad, Mauritania, 1351
Hong Kong, 593, 1240
index, Hulett Creek, Wyo., 1406
iron deposits, Mauritania, 1348
iron mine, Hong Kong, 594
iron ore in Egypt, 1104
Koegas asbestos area, South Africa, 1422
lead anomalous samples, Southern Ontario, 1266
Lemhi pass, Idaho, 179
Ma On Shan district, Hong Kong, 596
Magdalena-Kelly area, New Mexico, 697
Mattagami ore on crests of minor flexures, 749
Quebec, 741
Metallogenic (Lang), 1123
Michipicoten area, 899
mineral zoning, Linchburg orebody, 708
NE Congo, iron, 1387
nickel values, Jamaica, 1028
North American Precambrian mineral deposits, 640
of alteration and sulfide zones, Chibougamau, 329
of Central Peru, 403
of nickeliferous dike Arkansas, 101
of Quebec, 300
of the Midnite Mine area, Spokane, Washington, 243
ore deposits, Chinle formation, 515
orebodies, Mattagami area, Quebec, 751
piezometric surface, 295
potential tungsten deposits in Pakistan, 1255
Precambrian of North America, 639
pole positions, 1356
pumping wells, Neyveli lignite area, India, 284
samples, isotopically measured ore-leads, 18
serpentine and nickel, Jamaica, 1027
soil traverses at Baluba, 825
south-central Colorado, 773
southeastern British Columbia, 393
sphalerite samples, zones, Central City, Colorado, 1215
structural geologic, 704
Structure contour map, Ambrosia Lake, New Mexico, 1182
stumbling stud mine, Colorado, 782
thickness of lignite, Neyveli lignite area, India, 279
Tipuani gold mine, Bolivia, 1262
topographic Neyveli lignite area, India, 277
water table and piezometric surface, Neyveli lignite area, India, 289
Map—*Continued*
Wellsville gypsum area, Colo., 773
Yavapai County, Arizona, 918
Zuiderzee, The Netherlands, 1047
Marcasite, 94, 95, 134, 136, 139, 141, 145, 247, 251, 510
Marshall, Royal R., and Joensuu, Oiva, *Crystal habit and trace element content of some galenas*, 758
Martell on copper complexing, 1076
Mason on chelation, 1077
Mathewson, D. E., on Carbonaceous matter, 1197
Mattox, R. B., review of book by, 453
Matveenko, V. T., review of book by, 449
Maucherite, 1281
Mauritania, hard hematite, Fort Gouraud, 1354
Mauritz on spherulites, 1114
Mawdsley on Quebec, 321
McIntyre mine, analysis of pyrites, 472
McKelvey on uranium, copper and vanadium, 516
review of book by, 452
McKinney on lead isotopes, 64
McKinstry on breccia pipes, 499
McMurdie on manganese exchange, 198
Meikle, B. K., experiment on sulfides, 377
Meikle, B. K., with MacDougall, J. F., and Guy-Bray, J. V., and Saull, V. A., and Gill, J. E., *Experimental investigation of solid diffusion and volatilization of certain metallic sulfides*, 362
Menaul on colloids, 255
Mercer, B. W., communication, 1133
Mesabi, 640
Meta-autunite, 247, 249, 251, 1199
Metal distribution in near-surface soils, Northern Rhodesia, 823
Metaline district, Washington, lead isotopes, 20
Metallic deposits, Peru, 987
Metallogenic maps (Lang), 1123
relations, Superior-Timiskaming region, 913
Metamorphism, asbestos area, 1425
Metasomatic replacement of limestones by alkaline, fluoride-bearing solutions (Ames, Jr.), 730
zone related to a copper-bearing pyrite deposit, Minor elements in a (Kuroda), 847
Metatyuyamunite, 1199
Meteorites, lead in, 4
Metz, Harry E., on Bisbee, 498
Mexico, Cananea, 492, 498
Colorado pipe, 504
Paricutin, 86
Sonora, Pilares pipe, 497
Meyer, C., on Butte, 60
Micas at Chibougamau, 327
Microbreccia, 407
Microhardness studies of magnetite, 965
Milkey, on age of uranium deposits, 126

Miller on sulfate reduction, 262, 265
on sulfides, 269
on uranium oxide, 255
Miller, Robert J. M., *Wall-rock alteration at the Cedar Bay Mine, Chibougamau district, Quebec*, 321
Millerite, 100, 134
Mineral deposits and pillows, Kenora, Ontario, 1306
Spor Mtn., Utah, 943
to volcanics, relation of, Michipicoten area, Ont., 902
separation in lead isotope studies, 61
Mineralization, chronology of lead deposits, 21
processes of lead deposits, 22
Mineralized breccia pipes in Copper Basin, Arizona, 925
Mineralogy and genesis of the wolframite ore deposits, Needle Hill mine, New Territories, Hong Kong (Davis, S. G.), 1238–1249
and the question of zoning, northwestern Illinois zinc-lead district (James C. Bradbury), 132
at Cerro de Pasco, 418
Lemhi pass, Idaho, thorite deposits, 181
northwest Illinois zinc-lead district, 134
of the Ambrosia Lake ores, 1195
Shelogh vein, British Columbia, 398
of glauconite Biwabic iron formation, 1035
of iron ores, El-Bahariya Oasis, 1104
of Ma On Shan iron mine, Hong Kong (Davis), 592
of pumaceous perlitic rhyolite, Hungary, 1113
structural formulas, glauconite, 1036–1038
Minnesotaite, 1425
Minnesota, Secondary glauconite in the Biwabic iron-formation of (Tyler and Bailey), 1033
Minor elements in the gonditic manganese ore and its geochemical significance, Distribution of (Mookherjee), 723
Minor elements in a metasomatic zone related to a copper-bearing pyrite deposit (Kuroda), 847
Mississippi Valley lead-zinc deposits, lead in, 26
Mobility of copper, chemical factors affecting, 1067
microbiological factors affecting, 1070
physical factors affecting, 1065
vegetal factors affecting, 1066
Moenave, Springdale sandstone member, 516
Moenkopi, 112
and Chinle formations, stratigraphy of, 113
permeability of, 120
Mohler on quartz, 245
Mohr on hydrolyzates, 980
Molybdenite, 251
Molybdenum content of some limestones and related rocks in Southern Ontario, the lead, copper, zinc and (Warren, H. V. and Delavault, R. E.), 1265–1272
minerals, Ambrosia Lake, 1200
sulfide volatilization, 385
Monazite, 185, 442, 641, 691
grains radioactivity, 437
zircon, and "radioactive black" grains in blacksands of Rosetta, Egypt, radioactivity in (Gindy), 436
Monitor Butte, Chinle member, 516
Montana, boulder patholith, 62
Montgomery, H. B., *Description and origin of sulfides in pillow lavas, Maybrun mines property, Kenora district, Ontario, Canada*, 1305–1310
Montmorillonite, 512
Montroseite, 1199
Moody, J. D., on wrench faults, 414
Mookherjee, Asoke, *Distribution of minor elements in the gonditic manganese ore and its geochemical significance*, 723
Moore, D., with Becking, L. G. M. Baas, *Biogenic sulfides*, 259
Moore, F. B., with Granger, H. C., Santos, E. S., and Dean B. G., *Sandstone-type uranium deposits at Ambrosia Lake, New Mexico, an interim report*, 1179–1210
Moorhouse on nickel, 106
Morey on silicate melts, 82
Morrison formation, 514
Moss back, member Chinle, 516
Mullins, Allan with Tanner, William F., and Bates, John D., *Possible masked heavy mineral deposit, Florida Panhandle*, 1079
Murdoch, J., on tephroite, 44
Murthy, V. Rama, discussion by, 218
Murthy, V. Rama, and Patterson, Claire, *Lead isotopes in ores and rocks of Butte, Montana*, 59
Myers, A. T., with Huff, L. C., and Lovering, T. G., and Lakin, H. W., *Comparison of analytical methods used in geochemical prospecting for copper*, 855

Nakhla, F. M., *Iron ore deposits of El-Bahariya Oasis*, 1103
Nalivkin, D. V., review of book by, 1162
Nanz on potassium in Precambrian, 1042
Narayanaswamy, discussion of paper by, 1472
Native copper, 418
Navajo sandstones, 514
Nazarov, Yu. I., abstract of article by, 1160
Negative crystals, 547
Neilson on glacial geology, 301
Quebec Precambrian, 302

Nekrasov, E. M., review of book by, 621
Neverberg on Butte, 63
Neumann on hydrothermol solutions, 76–79
Nevada, Shoshone range, 492
New Brunswick, Canada, Temperatures of formation and origin of the Nigadoo and Brunswick Mining and Smelting No. 6 deposits (Kalliokoski), 1446–1455
New Mexico, Ambrosia Lake district, Morrison formation, 1185
Central district, the iron content of sphalerite from the, and the Bingham district, Utah (Rose), 1303–1384
Kelly limestone, 700
Magdalena district, 697
group, 701
Mississippian, 700
Pennsylvanian, 701
Precambrian, 700
Sandia formation, 701
Sandstone-type uranium deposits at Ambrosia Lake, New Mexico—an interim report (Granger, Santos, Dean, and Moore), 1179–1210
Santa Rita, 492, 504
Socorro County, Linchburg orebody, genesis and control of (Titley), 695
tertiary, 702
Tyrone, 493
Newell, N., on Peruvian stratigraphy, 404
Newhouse, W. H., on fluid inclusions, 87
on ore solutions, 147, 148
on paragenesis, 95
on wood tin, 213
New Zealand geysers, 75
Niccolite, 1282
Nichol, Ian with Hawley, J. E., *Trace elements in pyrite, pyrrhotite and chalcopyrite of different ores,* 467
Nickel-arsenic phases, 1274
-As, phase relations in the system (Yund, R. A.), 1273–1296
in chalcopyrites, 480
in pyrites, 474
in pyrrhotite, 478
in sulfides, 482
in the Blue Mountain area, Jamaica, W. I., geochemical prospecting for (Hill), 1025
magmatic ores, 467
mineralization, 106
secondary, 105
occurrences in soapstone deposits, Saline County, Arkansas (Sterling and Stone), 100
sulfide volatilization, 388
Nickeliferous pyrite, 104
Nier on Animikie rocks, 638
Noble on breccias, 493
Noll, W., on kaolinite, 252
on montmorillonite, 252
Nomograph, residual uranium date correction, 1400
Non-metallic minerals, Peru, 986
Noranda, 641
mine, analysis of pyrites, 472
Norman on Quebec, 321
Normetal mine, analysis of pyrites, 472
Northern Rhodesian copperbelt, geochemical prospecting investigations in the (Tooms and Webb), 815

Obituary—
McKinstry, Hugh Exton, 1304
Observations on cation exchange in some manganese minerals by electrodialysis (Sreenivas and Ray), 198
Occurrence of radioactive fluoritic sandstone, Wet Mountains, Colorado (Boyer), 780
Ochres, 564
Oder, C. R. L., zinc deposits, 1138
Oftedal on galena, 758
Ohle, E. L., discussion by, 444
Ontario, 641
Blind River area, 638
Elliot Lake uranium conglomerate, 641
lead, copper, zinc, and molybdenum content of some limestones and related rocks in Southern (Warren, H. Y. and Delavault, R. E.), 1256–1272
Michipicoten area, general geology, 899
structure, 900
Steeprock, 641
Sudbury, 498
Ore bodies, Midnite Mine, Spokane, Wash., 249
size and shape, Ambrosia Lake district, New Mexico, 1189
Ore control, sequence of events, Linchburg Mine, New Mexico, 711
Ore deposits and Archaean-Proterozoic boundary, 637
by panning heavy minerals from river sands, prospecting for (Zeschke, G.), 1250–1257
categories of lead isotope variation, 14
Copper Basin district, Arizona, 936
Kilo gold field, Congo, 589
Linchburg mine, New Mexico, 705
Ma On Shan mine, Hong Kong, 597
Mattagami area, Quebec, geology and (Denny), 740
of the Bannockburn Basin, Lardeau-area, British Columbia (Reed), 392
of Traversella, Italy, uranium-bearing bodies in the (Zucchetti) (communication), 1469–1471
sedimentary features in Tennessee (discussion), 444
uranium, 122
Elk Ridge, Utah, stratigraphic distribution, 123
Ore genesis, The data of lead isotope geology related to problems of (Cannon, Pierce, Antweiler, and Buch), 1

Ore localized by disturbed, faulted, or sheared rocks, 589
by itabirite, 591
by magnesium limestone, 598
by old structures, 587
by shear zones, 587
by tangential structure, 587
Ore minerals, rotation properties of certain anisotropic (Cameron, Davis, Guilbert, Larson, Mancuso, and Sorem), 569
Ore pipes versus barren pipes, 934
Ore shoots at Broken Hill, 1095–1096
localized by secondary local structures, 589
Ore varieties, Ambrosia Lake district, New Mexico, 1188
Organic compounds of copper, 1070
Organic sequestration of copper, (Fraser), 1063
Organometallic compounds of copper, 1074
Origin, bauxite, Jamaica, 1300
hematite, Mauritania, 1361
of bauxite, Sarawak, 979
of beryllium deposits, Thomas Range, Utah, 948
of copper porphyry breccias, brief outline of a possible (Kents) (Communication), 1465–1469
of gondites, 727
of gypsum, Cleora deposits, Colorado, 777
of manganese deposits, 56
of ore, Ma On Shan iron mine, Hong Kong, 601
of Nigadoo and Brunswick Mining and Smelting No. 6 deposits, New Brunswick, Canada, temperatures of formation and (Kalliokoski), 1446–1455
of ore, Mattagami area, Quebec, 755
of sulfides in pillow lavas, Maybrun mines property, Kenora district, Ontario, Canada, description and (Montgomery, H. B.) (communication), 1305–1310
of variations in the iron-content of sphalerite, 1224
salt water in aquifers, 1046
sulfide deposits, 485
uranium deposits, Hulett Creek, Wyo., 1418
O'Rourke, J. E., discussion of, 1473
Oruro, Bolivia, 489
Osborn, E. F., on magma, 84
Osborne, F. F., discussion, 1314–1316
Otvos, E. G., book review, 1162, 1318–1319, 1483
pumice and perlite in a rhyolite complex in Hungary, 1112
Outokumpu, galenas from, 23
Ovchinnikov, L. N., review of book by, 620
Overburden, Northern Rhodesian copperbelt, 819
Oxidation of magnetite, studies on the (Gokhale), 963
Oxidation zone, 510

Paige on breccias, 493
Panning heavy minerals from river sands, prospecting for ore deposits by (Zeschke, G.), 1250–1257
Paragenesis and mineral distribution, northwest Illinois zinc-lead district, 141
iron formations, Quebec, 317
iron ores of El-Bahariya Oasis, 1109
Kenora district, Ontario, 1307
lead deposits, Bannockburn, Basin, B. C., 400
Linchburg mine, New Mexico, 714
Ma On Shan ore, Hong Kong, 601
of sphalerite, Central City, Colorado, 1216
of tephroite in Calif., 44–55
thorite deposits, Lemhi pass, Idaho, 191
Paragenetic relations, manganese deposits, 55
Paramontroseite, 1199
Pararammelsbergite-Rammelsbergite, 1285
inversion, 1288
Park on zoning, 132
Partial pressures, 659
Partition of copper, 1073
Patterson, C. C., discussion by, 218
on lead in meteorites, 4
on lead isotopes, 64
Patterson, Claire, with Murthy, V. Rama, *Lead isotopes in ores and rocks of Butte, Montana,* 59
Pascoite, 1200
Pavlov, M. V., review of book by, 450
Peacock, M. A., on maucherite, 1275
Peat, copper concentrated in, 1063
Pebble columns and breccia associated with epigenetic ore deposits (Bryner), 488
"Pebble dikes," 490, 498
Pegmatites, depth of formation, 1478
Pelymsky, G. A., abstract of article by, 1157
Perdok on crystal forms, 769
Perlite and pumice in a rhyolite complex in Hungary (Otvos, Jr.), 1112
Permeability of Chinle and Moenkopi, 120
Perry on Cananea, 498
Petrography, rocks at wolframite mine, Hong Kong, 1243
Peru, Calzada copper mine, 612
Central, the pyrite body and copper orebodies, Cerro de Pasco Mine (Ward), 402
coal, 985
contact metasomatic copper mineralization at the Calzada mine (Stoll) (communication), 612
gold placers, 987
Guano, 986
Manon mine, 613

Peru—*Continued*
metallic deposits, 987
non-metallic minerals, 986
Norma deposit, 613
petroleum, 985
phosphate, 986
Toquepala, 494
vanadium, 987
Peters on breccia pipes, 496
on fluorite, 731
Petrascheck on metallogenic maps, 1129
Petrified forest, member Chinle, 516
Petrography, asbestos, South Africa, 1423
of pumaceous perlitic rhyolite, Hungary, 1113
Petroleum, Peru, 985
Pettijohn, F. J., on arkose, 512
on replacement, 1439
pH and Eh of copper solutions, 1069
Phase relations, hydrothermal solutions and magma, 76ff
in the system Ni-As (Yund, R. A.), 1273–1296
Phlogopite, 182
Phoenix on origin uranium ore, 127
Phosphate, Peru, 986
Phosphuranylite, 251
Photomicrograph, anomalous apatite, 325
apatite replacing calcite, 523
argillite, 313
arsenian wulfenite, 565
asbestos, 1427
bornite (Bn) and chalcopyrite (Cp) in FeS, 369
bornite (Bn) and chalcopyrite (Cp) pseudomorphous after pyrite, 369
bornite containing exsolved chalcopyrite, 369
calcite replaced by fluorite, 733, 1440
calcite replaced by whewhellite, 1441
chalcocite (Cc) pseudomorphous after magnetite, 375
chlorite rosettes, 325
of galena-sphalerite, 564
maucherite, 1293
pyrite, pyrrhotite, magnetite, 675
quartz-tetrahedrite siderite, 157, 160
sphalerite, 134, 142
thorite and other minerals, 184
Photomicrographs, artificial mineral replacements, 1019
chalcocite (Cc) pseudomorphous after pyrite (Py), 369
chalcopyrite contains exsolved bornite, 369
chlorite in chalcocite, 375
replaced, 380
cockade textures, 167
Egyptian iron ores, 1106, 1108
leucoxene, 1140
magnetite replaced by pyrite, 369
magnetitic chert, 309, 311
pseudoeutectic unmixing texture, 380
siderite, ankerite, 170
sideritic chert, 309, 313
Photomicrographs—*Continued*
siderite, quartz, sphalerite, 168
uranium minerals, 254
Picher field galenas, 763
Pipe-like bodies, 412
Pistacite, 324
Pitchblende, 249, 251
veins, Goldfields, Sask., lead isotopes in, 24
Placer cassiterite of the "Manley Tin Belt," Alaska (Stanley), 213
Pleistocene and recent accumulation of uranium in ground water saturated sandstone deposits, late (Rosholt, Jr.), 423
formations beneath the Dutch polderland, source of brackish ground water in (Volker), 1045
Physiography of southeastern India, 276
Pierce, A. P. and Cannon, R. S., Jr., and Antweiler, J. C., and Buch, *The data of lead isotope geology related to problems of ore genesis*, 1
Pillow lavas, Maybrun mines property, Kenora district, Ontario, Canada (Montgomery, H. B.) (communication), 1305–1310
Piper, A. M., on ground water, 1317
Pitchblende, 24, 1198
Plumboscientists, 24
Po_2-pH diagrams, 657
Polarization figures, color phenomena, 578
Polycrase, euxenite, 442
Porphyry breccias, brief outline of a possible origin of copper (Kents) (communication), 1465–1469
Pošepný on cockades, 150, 151
Posnjak on magnetite, 963
Possible geologic relationships in the formation of uranium^{235} *from curium*^{247} (Adler), 689
Possible masked heavy mineral deposit, Florida Panhandle (Tanner, Mullins, Bates), 1079
Postvolcanic effects on rhyolites, 1121
Potapova, Z. P., review of book by, 622
Pratten, R. D. with Carruthers, D. S., *Stratigraphic succession and structure in the Zinc Corporation Ltd., and New Broken Hill Consolidated Ltd., Broken Hill, New South Wales*, 1088
Precambrian Animikie series, 638
banded iron formation, remanent magnetism and the origin of hard hematites in (Gross and Strangway), 1345–1362
conglomerates, lead isotopes in, 24
economic aspects of Archaean-Proterozoic boundaries (Derry), 635
Grenville, 638
iron formation in Proterozoic, 639
Keewatin or superior nucleus, 638
Keewatin province, 637
ore deposits and Archaean-Proterozoic boundary, 637

Precambrian Animikie series—*Continued*
rocks, 516
Kilo area, Congo, 585
superior province, 637
terranes prospecting, 30
Yellowknife province, 637
Pre-hydrothermal breccia & pebble columns, 491
Price on heat flow, 70
Priorite, aeschynite, 443
Prokov'ev, A. P., book edited by, 794
Prospecting for ore deposits by panning heavy minerals from river sands (Zeschke, G.), 1250–1257
lead isotope data, application to, 29
radiochemical analyses and uranium migration dates, application of, 1419
Proterozoic, 1314
-Archaean boundaries, economic aspects of (Derry), 635
Pryor, T., discussion, 995
Przibram on quartz, 245
Psilomelane, 200
P-T diagram—system Ni-As, 1289
system Ni-As, 1291
Pumice and perlite in a rhyolite complex in Hungary (Otvos, Jr.), 1112
Pyrite, 12, 23, 29, 61, 94–97, 123, 134–36, 139, 141, 190, 247, 251, 307, 399, 414, 510, 545, 612, 671, 706, 1201
and marcasite from monosulfides by sulfate reduction, 265
body and copper orebodies Cerro de Pasco mine, Central Peru (Ward), 402
Cerro de Pasco, types of, 407
deposit, minor elements in a metasomatic zone related to a copper-bearing (Kuroda), 847
pyrrhotite and chalcopyrite of different ores, trace elements in (Hawley and Nichol), 467
qualitative analyses, 471
quantitative analyses, 473
Pyritic gold ores, 467
Pyrometer, 364
Pyroxenes, 706
Pyrrhotite, 104, 368, 671
bodies, 412
pyrite and chalcopyrite of different ores, trace elements in (Hawley and Nichol), 467
qualitative analysis, 476
quantitative analyses, 477

Quality of water, 295
Quartz, 152, 157, 161, 190, 327
Quartzites, ferruginous, 1387
Quartzose sandstones, 512
Quebec, Boulder Bay formation, 303
geology and ore deposits of the Mattagami area (Jenny), 740
Quebec—*Continued*
geology Chibougamau district, 321
geology of the Temiscamie iron-formation, Lake Albanel iron range, Mistassini territory (Quirke), 299
Kallio formation, 316
magmatic-pegmatitic-hydrothermal sequence at Lacorne (Brett), 784
Mattagami area, Garon Lake mines, 754
New Hosco mines, 753
Radiore mines, 754
stratigraphy, Precambrian, 302
structure, Albanel Lake area, 316
Temiscamie iron formation, 303
Queensland, 489
Quemont mine, analysis of pyrites, 472
Quirke on Quebec, 301
Quirke, Terence T., Jr., *Geology of the Temiscamie iron-formation, Lake Albanel iron range, Mistassini territory, Quebec, Canada*, 299

Raasch, Gilbert O., review of book edited by, 1318
Radioactive fluoritic sandstone, Wet Mountains, Colorado, occurrence of (Boyer), 780
Radio-active minerals with infrared aerial photography, the detection of (Winkler and Voight), 211
Radioactivity, Ambrosia Lake, 1205
and tertiary volcanic activity in Egypt (Gindy), 557
in Egypt, 559
in Monazite, zircon, and "radioactive black" grains in blacksands of Rosetta, Egypt (Gindy), 436
Radio barites, 1208
Radiochemical analyses, age calculations, 425
Ambrosia Lake, 1208
Radiochemistry, Ambrosia Lake, 1205
Radkevich, E. A., review of book by, 1151
Ramachandra, discussion of paper by, 1472
Ramdohr, P., on pararammelsbergite, 1294
Rao, M. R. Srinivaso, discussion by, 793
Rankama on uranium copper & vanadium, 516
Ransome on "metallogenetic," 1124
Ranspot on marcasite and uranium, 255
Rare earth thorite deposits, Lemhi pass, Idaho, 192
Recent accumulation of uranium in ground water saturated sandstone deposits, late pleistocene and (Rosholt, Jr.), 423
Red beds copper deposits, 514
Reed, Bruce, *Ore deposits of the Bannockburn basin, Lardeau-area, British Columbia*, 392
Reed on sandstones, 998
Reefs, 445
Reeves, Jr., C. C., *Geology of Cleora mining district gypsum deposits, Wellsville area, Colorado*, 772

Regional geology, Midnite Mine, Spokane, Washington, 243
Relationships of general structure to gold mineralization in the Kilo area (Central Africa) (*Woodtli*), 584
Remanent magnetism and the origin of hard hematites in Precambrian banded iron formation (Gross and Strangway), 1345–1362
Remobilization of old deposits, 567
Replacement, 510
deposits, 543
goethite and hematite, 558
in the origin of some cockade textures, the role of (Kutina and Sedláčková), 149
metasomatic, 558
reactions, anion metasomatic (Ames, Jr.), 521
cation metasomatic (Ames, Jr.), 1017
volume relationships during (Ames), 1438–1445
of limestone, 544
of limestones by fluorite, 736
Reviews—
Angaro-Ilimskie iron ore deposits (Chernyshev), 1151
Beaches and coasts (King), Sanders, 802
Calculation of reserves in mineral deposits, edited by Smirnov and Prokov'ev, 794
Contributions of the Soviet geologists, 226
Earth today (Cook and Gaskell), editors, 1320
Elements of crystallography and mineralogy (Wade and Mattox), 453
Gallium (Vershkovskaya et al.), 1152
Geographical encyclopaedia (Grigor'ev editor), 1153
Geologic map of California, Olaf P. Jenkins edition, Richard H. Jahns, 1154
Geological dictionary (Krishtofich), 1153
Geological evolution of North America —a regional approach to historical geology (Clark and Stearn), 623
Geological nomenclature (Schieferdecker), editor, 1318
Geological survey in 1960, Professional Paper 400 (Mckelvey), Alan M. Bateman, 452
Geology for South African students (Hamilton and Cooke), 227
Geology of Bavaria (Wurm), Otvos, 1318
Geology of deposits of the rare elements, 227
Geology of deposits of the rare elements. No. 9, New data on the mineralogy of deposits of the rare elements (Ginzburg); No. 10, Titano, tantalo, niobates (Ginzburg), 1482
Geology of the Arctic (Raasch), 1318
Reviews—Continued
Geology of the halogen deposits of the USSR (Ivanov and Levitskii), 226
Geology of the industrial rocks and minerals (Bates), 453
Geology of the lead-zinc deposits of Primor'ye (Radkevich et al.), 1151
Geology of the U.S.S.R.—a short outline (Nalivkin), 1162
Geology of tin deposits of North-East U.S.S.R. (Chaikovskii), 1153
Geosynclinal ore deposits, typical and pseudo typical and their relation to geotectonics and magmatism (Borchert), Otvos, 1161
Heavy-mineral prospecting and the analysis of concentrates (Zakharova), 795
Lehrbuch der Angewandten Geologie (Textbook of Applied Geology) (Bentz), review by Otvos, 1483
Mahadevan volume—a collection of geological papers (Krishnan), 1320
Metamorphism (Eliseev), 795
Methods and techniques in geophysics, Vol. I, ed. by S. K. Runcorn, 453
Mineralogy of the igneous complexes of Western Volhynia (Lazarenko et al.), 226
Minerals: a reference book, 1006
Nuclear geochronology (Starik) (Davidson), 1481
Oligocene oolitic iron ores of northern Turgai and their genesis (Yanitzkii), 1006
Paleogeologic maps (Levorsen), 623
Precambrian geology and geochronology of Minnesota (Goldich et al.), 1162
Principles of the geology of the U.S.S.R. Vol. I (Einor), Davidson, 1481
Principles of the theory of lithogenesis (Strakhov), 795
Principles of the theory of lithogenesis (Strakhov), Davidson, 1481
Problems of geochemistry, 226
Russian gold (Danilevskii), 795
Secondary zonation in the gold deposits of the Urals (Al'bov), 1482
Structural geology of Canadian ore deposits, Vol. II, Congress volume, 1483
Structure of ore fields and ore deposits (Vol'fson, Lukin, et al.), 1152
Tectonic development of Czechoslovakia, C. F. Davidson, 452
Thallium (Ivanov, et al.), 1152
Uranium mineralization of the Erzgebirge (Dymkov), Davidson, 1482
Uranium provinces (Konstantinov and Kulikova), Davidson, 227
Reynolds on fluidization, 494
Rhoden, H. N., discussion by, 1473
Richard, K., on pebble-breccias, 494
on Toquepala, 490
on breccia pipes, 931
Richmond on manganese minerals, 198
on Yellowstone lavas, 74

Rickard, M. J., communication, 991
Ricketts, J. E., on zinc deposits, 1138
Ridge on ore deposition, 719
Riebeckite, 1421
Rittmann on blacksands, 437
on volcanism, 558
Rhyolite color, Hungary
complex in Hungary, pumice and perlite in a (Otvos, Jr.), 1112
Robbins on magnetite, 963
Robinson, C. S., and Rosholt, J. N., Jr., *Uranium migration and geochemistry of uranium deposits in sandstone above, at, and below the water table. Part II. Relationship of uranium migration dates, geology, and chemistry of the uranium deposits*, 1404–1420
Robson on Sudbury, 498
Rock alteration, wolframite mine, Hong Kong, 1246
types, Midnite Mine, Spokane, Wash., 244
Roedder on fluid inclusions, 87
Rogers, A. F., on manganese minerals, 42
Rogers, W. B. and R. E., on synthetic mineralogy, 260
Role of replacement in the origin of some cockade textures (Kutina and Sedláčková), 149
Ronbeck on sulfides, 673
Roseboom, E. H., on $NiAs_2$, 1277
Rosholt, J. N., on Ambrosia Lake, 1208
Rosholt, John N., Jr., *Late pleistocene and recent accumulation of uranium in ground water saturated sandstone deposits*, 423
on isotopes, 425
Uranium migration and geochemistry of uranium deposits in sandstone above, at, and below the water table. Part I. Calculation of apparent dates of uranium migration in deposits above and at the water table, 1392–1403
Rosholt, J. N., Jr., with Robinson, C. S., *Uranium migration and geochemistry of uranium deposits in sandstone above, at and below the water table. Part II. Relationship of uranium migration dates geology, and chemistry of the uranium deposits*, 1404–1420
Ross, Virginia, on diffusion, 363
on sulfides, 368
Rossum, J. R., on ground water, 1316
Rotation properties of certain anisotropic ore minerals (Cameron, Davis, Guilbert, Larson, Mancuso, and Sorem), 569
Rowe on exothermic reactions, 554
Roxström, E., *A new core orientation device* (communication), 1310–1313
Roy, R., with Sreenivas, B. L., *Observations on cation exchange in some manganese minerals by electrodialysis*, 198
Rozanova, N. A., review of book by, 451
Russell on lead isotopes, 29
on lead isotopes at Broken Hill, 16
Rust on diatremes, 493

Sahama on fluorite, 731
on uranium, copper and vanadium, 516
Sales, Reno, on Butte, 60
Salt water in aquifers, 1046
Salt Wash member, 514
Samarskite, 443
Sanders, John E., review of book, 803
Sandstone, copper, vanadium, and uranium deposits in, their distribution and geochemical cycles (Fischer and Stewart), 509
deposits, late pleistocene and recent accumulation of uranium in ground water saturated (Rosholt, Jr.), 423
Sandstone-type deposits (Colorado plateau), lead isotopes in, 24
uranium deposits at Ambrosia Lake, New Mexico—an interim report (Granger, Santos, Dean, and Moore), 1179–1210
Sandstones, distribution of metals, characteristics of the host, 511
Santos, E. S. with Granger, H. C., Dean, B. G., and Moore, F. B., *Sandstone-type uranium deposits at Ambrosia Lake, New Mexico—an interim report*, 1179–1210
Sarawak, Bauxite in (Wolfenden), 972
Saull, V. A., with MacDougall, J. F., and Meikle, B. K., and Guy-Bray, J. V., and Gill, J. E., *Experimental investigation of solid diffusion and volatilization of certain metallic sulfides*, 362
Schaub on glauconite in Greenland, 1040
Scheelite, 213, 1257
Schefferville iron formation, 639
Schieferdecker, A. A. G., review of book edited by, 1318
Schlechten on sulfides, 383
Schmidt on magnetite, 964
on Hanover, 717
Schneiderhöhn on cockades, 151
Schouten, C., on replacement, 1438
Schroll on galena, 769
Schultz on clay minerals, 120
on uranium mineral genesis, 126
Schwartz on bornite and chalco pyrite, 370
on diffusion, 363
on kaolinite, 252
on sulfides, 1673
Seaborg on protactinium and thorium, 425
Secondary glauconite in the Biwabic iron-formation of Minnesota (Tyler and Bailey), 1033
Secretion laterally, 510
Sections across selected parts of prefault ore bodies at Ambrosia Lake, New Mexico, 1192

Section, alteration zones, Linchburg Mine, 706
Bannockburn basin, B. C., 397
bauxite deposit, Sarawak, 974
Broken Hill, 1091, 1092, 1093
Cerro de Pasco, 410, 420
Cerro de Pasco Mine, 409
Copper Basin breccia pipe, 927
copper in a termitary, 840
deposit at Ma On Shan, 598
El-Bahariya Oasis, 1105
geologic environments, Hulett Creek, Wyo., 1411, 1412
gold, conglomerate channels, Bolivia, 1261
Illinois zinc-lead deposits, 133
Kishegy rhyolite, Hungary, 1118
Linchburg orebody, 706
Maverick gypsum deposit, Colorado, 778
Needle Hill, Hong Kong, 1241
serpentine-soapstone body, 105
stratigraphic, Hulett Creek, Wyo, 1402
stratigraphic, Utah, 116, 124
structure, Michipicoten, Ontario, 901
Superior-Timiskaming region, 908
temperatures, Nigadoo, New Brunswick, 1448
Sections of ore body, Ma On Shan iron mine, 599
Sedimentary features, relation to ore, Ambrosia Lake district, New Mexico, 1191
Sedimentary rocks, Linchburg Mine, New Mexico, 699
Sedláčková, J., with Kutina, J., *The role of replacement in the origin of some cockade textures*, 149
Selenium minerals, Ambrosia Lake, 1200
Selenium, native, 1200
Senftle on uranium isotopes, 690
Sericite, 182
Serpentine, 104
nickeliferous, 105
soapstone, 106
Serpentinite, nickel in, 1029
Sequence deposition, 545
Shadlun, T. N., abstract of article by, 1002
Sharp on Lemhi pass, 180
Sharpe, J. V. A., on rock color, 1194
Shatalov, E. I., review of book by, 619
Shawe on origin uranium ore, 127
Shawe, D. R., on plateau uranium, 1194
Sheldon on faults, 249
on granite, 248
on Midnite Mine ore, 251
on uranium ore, 249
Shinarump member, Chinle formation, 515
Shoemaker on diatremes, 493
Shouten on textures, 93
Shrode on fluid inclusions, 543
Siderite, 94, 153, 157, 161, 313, 315, 317, 318
Sidgwick on copper, 1074
Siems, Peter L., discussion by, 790
Silver in chalcopyrites, 480
in galena ores from Broken Hill, Australia, content of trace amounts of (Bounsall) (communication), 608
orebodies, 412
localization, 412
in pyrites, 476
in pyrrhotites, 479
in sulfides, 483
Silver, L. T., and Cannon, on lead isotopes at Sudbury, 16
Silver, L. T., on lead isotopes, 64
Simmons, G. C., on plateau uranium, 1194
Simpson, E. S., on leucoxene, 1146
Sims, P. K. with Barton, P. B., Jr., *Some aspects of the geochemistry of sphalerite, Central City district, Colorado*, 1211–1237
Skarn, 599
Skinner, B. J., on sphalerite, 1225
Slack on heat flow, 70
Slide rule computer for determining apparent angles of lines, 207
Slide-rule determination of apparent angle, 208
Slovakia, cockade texture, 162
cockade textures from Polkanová near Banská Bystrica, 152
Smirnov, V. I., book edited by, 794
Smithson, F., on sediment, 996
Smithsonite, 134, 564
Smythe, D. D., on breccia pipes, 497
Soapstone, 104
Soapstone deposits, Arkansas, Ovachita Mtns., 104
Saline County, Arkansas, nickel occurrences in (Sterling and Stone), 100
Soil horizons, Northern Rhodesian copperbelt, 819
Soil profiles, Northern Rhodesia, 820
Soils on serpentinite, Jamaica, 1026
Sokolov, G. A., abstract of article by, 1156
Solid solutions, 468
Solid state reactions CuS and FeS, 368
Solubility of copper salts, 1067
Solution migration, possible paths of, 127
Some aspects of the geochemistry of sphalerite, Central City district, Colorado (Sims and Barton), 1211–1237
Sorem, R. K., with Cameron, E. N., and Davis, J. H., and Guilbert, J. M., Larson, L. T., and Mancuso, J. J., *Rotation properties of certain anisotropic ore minerals*, 569
Sorotchinsky on metamorphics, 605
Sosman on magnetite, 963
Source of brackish ground water in Pleistocene formations beneath the Dutch polderland (Volker), 1045
South Africa, Crocidolite from the Koegas-Westerberg area. Part 1. Occurrence (Cilliers), 1421–1429; *Part 2. Mineralogical investigation* (Freeman, Hodgson, and Taylor), 1429–1437

South America, Precambrian mineral deposits, 644
Precambrian nuclei, 644
Spectrographic accuracy, 470
analyses of minerals, northwest Illinois zinc-lead district, 136
conditions, 469
line pairs, 470
precision, 470
standards, preparation, 470
working curves, 470
Specularite, 188
Sphalerite, 95, 133, 134, 135, 136, 138, 143, 247, 399, 414, 415, 545, 675, 706
by sulfate reduction, 268
Central City district, Colorado, some aspects of the geochemistry of (Sims and Barton), 1211–1237
from smithsonite by sulfate reduction, 268
from the Central district, New Mexico and the Bingham district, Utah, the iron content of (Rose), 1363–1384
minor elements in, 1232
Springdale sandstone member Moenave, 516
Spurr, J. E., on cockades, 151
on metalliferous provinces, 1124
Sreenivas, B. L. and Roy, R., *Observations on cation exchange in some manganese minerals by electrodialysis,* 198
Sreenivas, B. L., discussion by, 793
Staaz, Mortimer H., and Griffitts, Wallace R., *Beryllium-bearing tuff in the Thomas Range, Juab County, Utah,* 941
Stakhova, M. S., review of book by, 450
Stanley, Kirk W., *Placer cassiterite of the "Manley Tin Belt," Alaska,* 213
Starik, I. E., review of book by, 1481
Strakhov, N. M., review of book by, 1481
Statistical analysis, geochemical sampling, 1029
Statistical distribution of copper, prospective tests, 861
Sterling, Philip J., and Stone, Charles G., *Nickel occurrences in soapstone deposits Saline County, Arkansas,* 100
Stearn, Colin W., review of book by, 623
Stern, T. W., on age of uranium deposits, 126
on lead isotopes, 23, 29
on uranium ages, 690
Stevens on weathering, 980
Stewart, John H. with Fischer, Richard P., *Copper, vanadium, and uranium deposits in sandstone—their distribution and geochemical cycles,* 509
Stieff, L. R., age of uranium deposits, 126
on lead isotopes, 23, 29
on uranium ages, 690
Stilpnomelane, 307, 310, 314, 315, 1424
Stokes, H. N., on pyrite replacement, 94
Stoll, W. C., communication, 985
Tertiary channel gold deposits at Tipuani, Bolivia, 1258–1264
Stone, Charles G., with Sterling, Philip J., *Nickel occurrences in soapstone deposits Saline County, Arkansas,* 100
Strakhov, N. M., review of book by, 795
Strand, Rudolph G., review of maps by, 1154
Strangway, D. W. with Gross, W. H., *Remanent magnetism and the origin of hard hematites in Precambrian banded iron formation,* 1345–1362
Stratigraphic associations of uranium deposits, Elk Ridge area, Utah, 124
Stratigraphic correlation by geochemistry, 1270
diagrams, Neyveli lignite area, India, 281–282
Stratigraphic section, Ambrosia Lake district, New Mexico, 1184
Linchburg mine, New Mexico. 699
Stratigraphic succession and structure in the Zinc Corporation Ltd. and new Broken Hill Consolidated Ltd., Broken Hill, New South Wales (Carruthers and Pratten), 1088
Broken Hill, 1091–1097
Stratigraphy, Ambrosia Lake district, New Mexico, 1185
Bannockburn basin, B.C., 394
Mattagami area, Quebec, 743, 748
Mistassini group, Quebec, 302
Neyveli, lignite deposits, India, 278
Northern Rhodesian copperbelt, 818
of the Moenkopi and Chinle formations, 113
Wellsville area, Colo., 772
Structural controls, 419
geology of Canadian Ore Deposits, Vol. II, Congress Volume, 1483
features, relationship of ore to, Ambrosia Lake district, New Mexico, 1190
geology, Cerro de Pasco, Peru, 412
interpretation, Broken Hill, 1097
interpretation, Superior-Timiskaming Region, 912
relations Lemhi pass, Idaho, thorite deposits, 180
Structure, Albanel, Quebec, 316
Ambrosia Lake district, New Mexico, 1186
Bannockburn basin, B.C., 396
Copper Basin district, Arizona, 923
in the Zinc Corporation Ltd. and new Broken Hill Consolidated Ltd., Broken Hill, New South Wales, Stratigraphic succession and (Carruthers and Pratten), 1088
kilo area, Congo, 587
Linchburg mine, New Mexico, 703
Ma On Shan mine, Hong Kong, 597
Mattagami area, Quebec, 748
Michipicoten area, Ontario, 900
Midnite Mine, Spokane, Wash., 248
Neyveli, lignite area, India, 285
of pyrite body, Cerro de Pasco, 411

Structure—*Continued*
Spor Mtn., Utah, 943
to gold mineralization in the Kilo area (Central Africa), relationships of general (Woodtli), 584
Studies on the oxidation of goethite (Gokhale), 1058
Studies on the oxidation of magnetite, (Gokhale), 963
Stoll, W. C., *Contact metasomatic copper mineralization at the Calzada mine, Peru* (communication), 612
Subramanyam, V., with Jones, Paul H., *Ground-water control in the Neyveli lignite fields, South Arcot district, Madras State, India,* 273
Subsolidus relations, system Ni-As, 1280
Sudbury, Ont., 489, 641
mine, analysis of pyrite, 472
lead isotopes in, 16
Sukhanova, E. N., abstract of article by, 1159
Sulfate reducing bacteria, 262
Sulfide ores formed from sulfide-deficient solutions (Lovering), 68
Sulfides, Experimental investigation of solid diffusion and volatilization of certain metallic sulfides (MacDougall, Meikle, Guy-Bray, Saull, and Gill), 362
in pillow lavas, Maybrun mines property, Kenora district, Ontario, Canada, description and origin of (Montgomery, H.B.) (communication), 1305–1310
mode of occurrence and source of trace elements in, 468
Sulfur-containing aqueous solutions, in the system Fe-S-O, and their correlation during ore deposition, equilibria in (Barnes and Kullerud), 648
Supergene copper orebodies, Cerro de Pasco, 419
minerals, 418
Superior-Timiskaming region, general geology, 907
metallogenic relations, 913
structural interpretation, 912
Syneresis cracks, 318
Syngenetic ore, 444
System, Fe-S-O, 665, 669
and aqueous equilibria, 675
and their correlation during ore deposition, equilibria in sulfur-containing aqueous solutions in the (Barnes and Kullerud), 648
experimental results, 671 ff
Szádeczky-Kardoss on pumice, 1118

Table, activity diagrams, constants used to calculate, 655
actual vs. predicted sample values, prospecting, 863
analyses and ages, Hulet Creek, Wyo., 1395, 1405

Table—*Continued*
analyses, atomic ratios, Hulett Creek, Wyo., 1409
atomic cell contents, crocidolite, 1436
analyses bauxite, 978, 979
insoluble residue, Jamaican limestone samples, 1298
iron-formation, 306, 308, 312
of bauxitic soil samples, Jamaica, 1299
of beryllium-bearing nodules, 948
of galenas, 766
Picher Field, 764
upper Mississippi Valley, 761
of make-up samples, 609
of rocks, Sarawak, 975
of Tuffaceous material, Jamaica, 1300
Jamaica, 1300
nickeliferous serpentine, 108
of pyrites, 472
Archaean segments described, 909
attitudes of veins at Cerro de Pasco, 416
calculated analysis Jamaican limestone, 1299
classification of alteration minerals, 324
chemical analysis of serpentinite, 1026
chemical compositions of anthophyllite-cordierite rock, 849
of biotite-cordierite rock, 849
rhyolites, 1117
clay and sand in soil horizon, 821
cobalt in sulphides, 473
cobalt spectrographic and 'X-ray' compared, 471
color, iron oxide content, rhyolite, 1121
comparison copper analytical technique, 983
copper, cobalt and nickel contents of soils, Northern Rhodesia, 824
copper, vanadium and uranium in common rock types, 517
cost of geochemical prospecting tests, 864
crocidolite, chemical analyses, 1432
densities, 1434
unit cell data, 1431
crystallography of the nickel arsenides, 1276
determination of heavy minerals in the field, 1253
diffusion experiments on sulfides, 377
DTA curves, crocidolite, 1434
Eh and pH of soils, 1069
equilibria for oxidation of sulfides, 270
equilibrium constants, data used to calculate, 652
iron oxides and sulfides, 676
evaluation of various analytical methods, 870
experiments, pararammelsbergite-rammelsbergite inversion, 1290, 1292
fault and fold directions, Cerro de Pasco, 413
Fe content, Bingham district, Utah, 1376
Fe in sphalerite, Central district, N. M., 1373–1375
Field separation of heavy minerals, 1253

Table—*Continued*
Fluorescence of minerals useful in prospecting, 1254
geochemical prospecting tests vs. quantitative analysis, 869
glauconite analysis, 1036
goethite x-ray patterns, 1060
hypotheses to explain salt of ground water, 1049
inversion of rammelsbergite and pararammelsbergite, 1292
ionic radii actinides and lanthanides, 692
kinetic phase relations, 527, 1021
lead evolution model, 9
lead isotopes, rocks, Butte, 66
lead isotopes in sulfides, Butte, 65
lead in sulphides, 475
liquidus-solidus experiments in system Ni-As, 1286
limestones, analysis, Ontario, 1267–1271
magnetic measurements, iron ore body, 1350
iron ore, Mauritania, 1359
microhardness of magnetite, 966
minor elements in anthophyllite-cordierite rock, 850
minor elements in biotite-cordierite rock, 853
in gondites, 726
of rocks, 484
N. E. Congo iron ore deposits, 1388–1390
niccolite solid solution X-ray data, 1283
niccolite solvus between NiAs and $NiAs_2$, 1284
nickel in sulphides, 473
serpentine, 1031
values in serpentinite, 1030
oxidation and differential-thermal properties of rhyolites, 1120
paragenesis, Nigadoo, New Brunswick, 1449
pararammelsbergite-rammelsbergite inversion, 1284
partial pressures of oxygen in equilibrium with magnetite, 667
qualitative analysis of chalcopyrites, 479
of pyrrhotites, 477
radioactivity zircon, 439
rock analyses, granite and quartz porphyry, 1244
rotation properties of ore minerals, 574–75
sample locations, asbestos, South Africa, 1428
samples from Hauber mine, 425, 427
sandstone hosts to deposits of copper, vanadium and uranium, 511
sieve analyses aquifers, India, 280
silver in galena, 610
in sulphides, 474
spectrochemical analyses of sphalerite, 1223, 1224
spectrographic line pairs, 470
stratigraphic Quebec, 302
Table—*Continued*
sphalerite analyses, 1450, 1452
sphalerite cell dimensions, 716
stratigraphy of asbestos bands, 1427
of Broken Hill, 1094
Mattagami area, Quebec, 744
subsolidus experiments in system Ni-As, 1279
sulfate and carbonate solubility data, 1022
sulfide diffusion experiment results, 366–367
sulfide diffusion experiments, 383–384
temperature estimates from some growth zoned sphalerite crystals, 1231
temperature of formation of sphalerite, 1229
temperatures of inclusions, 548, 549
temperatures, sphalerite, New Brunswick, 1453
thermodynamic values, system Fe-S-O, 676
thorite, analyses, 193
tin in sulphides, 475
trace elements in pyrites, 472
in pyrrholites, 477
in sulfides, 482
transportation distances in river sands, 1252
uranium minerals, Ambrosia Lake, 1195
vapor pressures covellite and digenite, 684
over pyrite and pyrrhotite, 667
variation of copper replicate soil samples, 867
water, Clarendon Plains, Jamaica, B.W.I., 539
X-ray data, crocidolite
for covellite, 265
for sooty uraninite, 253
X-ray powder data of $Ni_{11}As_8$, 1283
Tables, spectrographic analyses of galena, 140
spectrographic analyses of pyrite and marcasite, 141
of sphalerite, 137
Takahashi on glauconite, 1040
Talc, 104
Taliaferro on manganese deposits, 42, 43
Talmage, S. B., on cockades, 151, 152
on cockade textures, 150
Tanner, William F., Mullins, Allan, and Bates, John D., *Possible masked heavy mineral deposit, Florida Panhandle*, 1079
Tanton on lead isotopes, 29
Tatarinov, P. M., review of book by, 447
Taylor, H. F. W., with Freeman, A. G., and Hodgson, A., *Crocidolite from Koegas-Westerberg Area, South Africa. Part 2. Mineralogical investigation*, 1429–1437
Technique, analysis of Fe in sphalerite, 1364
of galena, 758

Technique—*Continued*
autoradiographs, polished surfaces, 559
calcite by fluorite replacement, 731
chemical analyses, crocidolite, 1433
of water, 535
trace silver in galenas, 609
correction of rotation values, 572
density measurements crocidolite, 1433
diffusion of sulfides experimental apparatus, 364
etching manganese minerals, 41
experimental replacement, 1439
fluid inclusion study, 546–547
geochemical prospecting, Chile, 1457
tests, 859
goethite oxidation, procedure, 1059
heating stage, 546
ion exchange apparatus, 522
magnetic measurement, 1354
measurement of rotation properties, ore minerals, 569
method of investigation, system Fe-S-O, 670
Ni-As phase studies, 1277
of apparent angles of inclined linear elements (Hagen), 204
oxidation of magnetite procedure and apparatus, 965
polishing artifacts, surface film, 579
precision of silver in analyses, 610
preparation materials diffusion experiments, 363
Telethermal replacement, 563
sampling, bauxite, tuff, limestone, 1297
sampling procedure Ni, 1027
soil analysis for cobalt, 823
for copper, 822
soil sampling, 822
sphalerite sampling, preparation, for emission spectroscopy, 1220
sulfide separation, 469
Tectonics, radial, 587
tangential, 587
Telescoped vein, 1447
Temperature and crystal habit in galena, 769
from sulphide polymorphs, 1294
of formation, Linchburg mine, New Mexico, 716
on equilibria, effects of varying, 664
Temperatures of formation and origin of the Nigadoo and Brunswick Mining and Smelting No. 6 deposits, New Brunswick, Canada (Kalliokoski), 1446–1455
of mineralization by liquid inclusions, Cave-in-Rock fluorspar district, Illinois (Freas), 542
of vapor bubble disappearance, 548
Tennant on geochemical prospecting, 863
Tennantite, 415, 418
Tephroite in California manganese deposits (Hewett, Chesterman, and Troxel), 39
Tephroite in Calif., paragenesis of, 44–55
in United States, 44
Terminology, "breccia pipe," 490
Terrones, A. J. on Cerro de Pasco, 410
Tertiary Channel Gold Deposits at Tipuani, Bolivia (Stoll, W. C.), 1258–1264
Tertiary sandstones, 514
Terzaghi, Karl, review of writing by, 624
Tetrahedrite, 153, 157, 161, 399
-tennantite, 414
Textures, colloform growths, 561
comb structure, 544
"coontail ore," 544
Thaden on origin of uranium ore, 127
Thalenite, 692
Thermal analysis of magnetite, 967
Thermocouple, 364
Thermodynamic relations, aqueous, diagrams, applications, 681
Thenardite, 1202
Thorarinsson on geysers, 74
Thordarson on sandstone lenses, 120
Thorite, 182
Thorite deposits, Lemhi Pass, Idaho, 180
origin of the, 195
size and tenor of deposits, 193
Thorium mineralization in the Lemhi Pass area, Lemhi County, Idaho (Anderson), 177
Thrust faults, Cerro de Pasco, 413
Tin in chalcopyrite, 481
in pyrites, 476
in pyrrhotite, 479
Tipuani, Bolivia, tertiary channel gold deposits at (Stoll, W. C.), 1258–1264
Tischendorf on galena, 768
Titanium in chalcopyrites, 481
in pyrites, 476
in pyrrhotite, 479
Titley, Spencer R., *Genesis and control of the Linchburg orebody Socorro County, New Mexico*, 695
Tooms, J. S., and Webb, John S., *Geochemical prospecting investigations in the Northern Rhodesian copperbelt*, 815
Topaz, 213
Toquepala, Peru, 490
Torbernite, 251
Total activity, effects of varying, 662
Toulmin, P., on sphalerite, 1225
Trace amounts of silver in galena ores from Broken Hill, Australia, content of (Bounsall) (communication), 608
Trace element content of some galenas, crystal habit and (Marshall and Joensuu), 758
distribution in sulfides, 481
in pyrite, pyrrhotite and chalcopyrite of different ores (Hawley and Nichol), 467
in sulfides, mode of occurrence and source of, 468
variation with temperature, 768
Trask, P. D., on manganese, 45

Trimble on uranium ore origin, 127
Troilite, 4, 8
Troxel, B. W., with Hewett, D. F., and Chesterman, C. W., *Tephroite in California manganese deposits*, 39
Tuffaceous, 512
Tuffs, 512
Turneaure on metallogenetic province, 1125
Turquois, 561
Tuttle on magma, 84
on silicate melts, 79
Twenhofel on glauconite, 1041
on magnetite, 964
Tweto, Ogden, on intrusive breccia, 497
T-X diagram of the "condensed" system Ni-As, 1278
Tyler, S. A., and Bailey, S. W., *Secondary glauconite in the Biwabic iron-formation of Minnesota*, 1033
Tyler, S. A., on glauconite, 1041
Tyuyamunite, 1199

Ukranian shield, 636
Ultraviolet light, examination by, 1255
Uncompahgre highland, 515
Unit cell, crocidolite, 1435
Upper Mississippi Valley district galenas, 760
Upson, J. E., foreword by, 1045
Uraniferous asphaltite, 123
Uraninite, 5, 6, 23, 24, 122, 249, 251, 641
Italy, 1469; analysis, 1470
-marcasite association, 253
Midnite Mine, Spokane, Wash., 252
vein, Coeur d'Alene, lead isotopes in, 24
veins (Arizona, Dripping Spring quartzite), lead isotopes in, 24
U^{235} enrichment, discussion of, 692
Uranium^{235} from curium,^{247} possible geologic relationships in the formation of (Adler), 689
Uranium-bearing bodies in the ore deposits of Traversella, Italy (Zucchetti) (communication), 1469–1471
conglomerates, lead isotopes in, 24
copper, and vanadium deposits in sandstone—their distribution and geochemical cycles (Fischer and Stewart), 509
deposits at Ambrosia Lake, New Mexico —an interim report, Sandstone-Type (Granger, Santos, Dean, and Moore), 1179–1210
Ambrosia Lake district, New Mexico, 1187
factors controlling localization, 128
genesis of ore, 125
guides to prospecting, 129
in ground water saturated sandstone deposits, late pleistocene and recent accumulation of (Rosholt, Jr.), 423
in rocks, 518
materials, Ambrosia Lake, 1198
Uranium-bearing bodies—Continued
maximum and minimum dates for single generation, 1398; for second generation, 1400
Migration and geochemistry of uranium deposits in sandstone above, at, and below the water table. Part I. Calculation of apparent dates of uranium migration in deposits above and at the water table (Rosholt), 1392–1403; *Part II. Relationship of uranium migration dates, geology, and chemistry of the uranium deposits* (Robinson and Rosholt), 1404–1420
migration interpretations, 428
mineralization at the Midnite Mine, Spokane, Washington (Barrington and Kerr), 241
Midnite Mine, Spokane, Wash., 251
ore deposits in the Elk Ridge area, San Juan County, Utah, Distribution of (Campbell and Lewis), 111
Uranophane, 251
Utah, Beryllium-bearing tuff in the Thomas Range, Juab County (Staatz and Griffitts), 941
Bingham breccia pipes, 501
Bingham Canyon, 497
Bingham district, the iron content of sphalerite from the Central district, New Mexico and (Rose), 1363–1384
cactus ore deposit, 503
cactus pipe, 501
distribution of uranium ore deposits in the Elk Ridge area, San Juan County (Campbell and Lewis), 111
O.K. ore deposit, 503
O.K. pipe, 489
San Francisco district, 503
Tintic, Plutus mine, 498
U.S. and Lark mine, 1378
volcanic rocks, Thomas Range, 942

Val d'Or, 641
Valensi on pH diagrams, 657
Vanadium, copper, and uranium deposits in sandstone—their distribution and geochemical cycles (Fischer and Stewart), 509
deposits, 514
in igneous rocks, 517
in pyrrhotites, 479
minerals, Ambrosia Lake, 1199
Peru, 987
van Baren on hydrolyzates, 980
Varju on Hungarian Rhyolites, 1112
Veins at Cerro de Pasco, 414
formed by wrench faults, 417
Vermaas on magnetite, 964
Versey, H. R., discussion, 1316–1317
Vershkovskaya, O. V., review of book by, 1152
Voight, Barry with Winkler, Erhard M., *The detection of radio-active minerals with infrared aerial photography*, 211

Volatiles from magma, 69–76
Volcanic activity in Egypt, Radioactivity and tertiary (Gindy), 557
emanations, 84
Vol'fson, F. I., review of book by, 1152
Volker, A., *Source of brackish ground water in Pleistocene formations beneath the Dutch polderland,* 1045
Volume relationships during replacement reactions (Ames), 1438–1445
Vugs, 421
sand filled, 444

Wabash Lake iron deposit, 640
Wad, 134
Wade, F. A., review of book by, 453
Wadsley on manganese exchange, 198
Wahl, Quebec Precambrian, 302
Wahlstrom on galena, 758
Walcher on kaolinite, 252
Walker, J. F. on Bannockburn, B. C., 401
on Bannockburn, B. C. structure, 396
on British Columbia, 392, 393, 394
Walker, R. T., on Bingham, 501
on breccia pipes, 492
Walker, W. J., discussion by, 1149
Wall-rock alteration at the Cedar Bay Mine Chibougamau district, Quebec (Miller), 321
Wall rocks, reaction of emanations, 95
Word, Hector J., *The pyrite body and copper orebodies Cerro de Pasco Mine, Central Peru,* 402
Warps in contact as ore traps, 419
Warren, H. V. and Delavault, R. E., *The lead, copper, zinc, and molybdenum content of some limestones and related rocks in Southern Ontario,* 1265–1272
Washington, Uranium mineralization at the Midnite Mine, Spokane (Barrington and Kerr), 241
Wasserstein, on spectrography, 608
Waters on cassiterite, 214
Weathering, asbestos, 1423
Webb, John S. with Tooms, J. S., *Geochemical prospecting investigations in the Northern Rhodesian Copperbelt,* 815
Webb, R. W., on tephroite, 44
Weeks, Alice D., on mineral associations, 125
on uranium minerals, 121, 122
Weis on exothermic reactions, 554
Weller on Illinois fluorite, 551
Welo on magnetite, 964
Wernick, J. H., on sulfides, 1227
Westwater Canyon members, 514
Wheeler, Dooley P., Jr., discussion by, 618
White, D. E., on geochemistry of volcanic emanations, 88
on rock alteration, 74
White, M. L., on geochemical prospecting, 863
Wiikite, 692
Wilkinson, J. F. G., on leucoxene, 1141
Williams, Howel on diatremes, 493, 494
Wilson, M. E., on Quebec, 321
Wind River formation, 514
Winkler, Erhard M., and Voight, Barry, *The detection of radio-active minerals with infrared aerial photography,* 211
Wisser, E., on Bisbee, 502
on breccias, 493
Witkind, I. J., on intrusive ages, 112
on uranium ore origin, 127
Witwatersrand, lead isotopes in, 24
Wolframite analysis, 1248
Wolframite ore deposits, Needle Hill mine, New Territories, Hong Kong (Davis, S. G.), 1238–1249
Wolfenden, E. B., *Bauxite in Sarawak,* 972
Wood, E. J. on sulfate reducing bacteria, 262
Wood tin, 214
Woodmansee, W. C. on uranium deposits, 424
Woodtli, R., *Gold impregnation deposits in the Moto area (Central Africa),* 603
Relationships of general structure to gold mineralization in the Kilo area (Central Africa), 584
Wrench faults, Cerro de Pasco, 413
Wrench fault tectonics, 417
Wright, H. D., on clay alteration, 252
on quartz, 245
Wulfenite, arsenian, 564
Wurm, Adolf, review of book by, 1318
Wurtzite, 135
Wüstite, *672*
Wyllie, P. J., on magma, 84
Wyoming, Atlantic City, lead isotopes, 31
Baggs, 514
Crooks Gap, 514
Gas Hills, 514
Hulett Creek, ages, 1392–1420
Powder River Basin, 514
Shirley Basin, 514

Xenotime, 187, 692
X-ray, diagrams, products of sulfate reduction, 266
intensity patterns of braunite, 200
patterns dialysed manganese minerals, 202
powder data for argentite, 267
for digenite, 267
for galena, 268
for sphalerite, 268
spectrograph, 470
study, manganese minerals, 199
of magnetite, 968

Yanchenko, M. T., review of book by, 450
Yanitzkii, A. L., review of book by, 1006
Yellowstone, geysers, 74
Yoder on vapor pressure, 666
Young, R. G., on pitchblende, 1198
Yttrotantalite, 442
Yugoslavia, Stantrg lead-zinc breccia pipe, 495

Yund, R. A., *Phase relations in the system Ni-As*, 1273–1296

Zakharova, E. M., review of book by, 795
Zans, V. A., on Jamaica phosphates, 1301
Zeihen, Lester G., discussion by, 216
Zeschke, G., *Prospecting for ore deposits by panning heavy minerals from river sands*, 1250–1257
Ziauddin, discussion of paper by, 1472
Zinc and molybdenum content of some limestones and related rocks in Southern Ontario, the lead, copper (Warren, H. V. and Delavault, R. E.), 1265–1272
  carbonate, 94
  copper and lead in rivers draining Chilean Andes (Degrys), 1456–1464
  -lead district, mineralogy and the question of zoning, northwestern Illinois (Bradbury), 132
  sulfide volatile transfer, 385
Zippeite, 251, 1199
Zircon, 5, 12, 28, 641
  monazite, and "radioactive black" grains in blacksands of Rosetta, Egypt, radioactivity in (Gindy), 436
  radioactivity, 438
Zoisite, 324
Zonal arrangement of the ores in northwest Illinois, possibie causes of the, 146
Zoning, Central City, Colorado, 1214
  growth of sphalerite, 1216
  Linchburg mine, New Mexico, 706–711
  northwestern Illinois zinc-lead district, mineralogy and the question of (James C. Bradbury), 132
  of nickel arsenides, 1293
Zontov, N. S., review of article by, 1001
Zucchetti, S. C., *Uranium-bearing bodies in the ore deposits of Traversella, Italy* (Communication), 1469–1471

ECONOMIC GEOLOGY

AND THE

BULLETIN OF THE SOCIETY OF ECONOMIC GEOLOGISTS

EDITOR: ALAN MARA BATEMAN
Yale University, New Haven, Connecticut

BUSINESS EDITOR: MORRIS M. LEIGHTON
Illinois Geological Survey, Urbana, Illinois

ASSISTANT EDITORS

H. E. MCKINSTRY, *Harvard University*
JOE W. PEOPLES, *Wesleyan University*
M. LEROY JENSEN, *Yale University*
J. D. BATEMAN, Toronto, Ont.
R. H. JAHNS, *Pennsylvania State University, University Park*

ASSOCIATE EDITORS

D. F. HEWETT
U. S. Geological Survey, Menlo Park, Calif.

A. I. LEVORSEN
Tulsa, Okla.

J. E. HAWLEY
Queen's University, Kingston, Ontario

W. E. WRATHER
Washington, D. C.

A. N. SAYRE
U. S. Geological Survey, Washington, D. C.

L. C. GRATON
Orange, Connecticut

E. S. MOORE
University of Toronto, Toronto, Can.

GEORGE W. MOREY
U. S. Geological Survey, Washington, D. C.

N. H. FISHER
Bureau of Mineral Resources Canberra, Australia

PER GEIJER
Djursholm, Sweden

P. F. FOURMARIER
Liège University, Liège, Belgium

M. S. KRISHNAN
Andhra University, Waltair, India

T. W. GEVERS
University of the Witwatersrand, Johannesburg, S. Africa

C. F. DAVIDSON
St. Andrews University, Fife, Scotland

J. A. BROGGI
Instituto Geologica, Lima, Peru

TAKEO WATANABE
University of Tokyo, Tokyo, Japan

KONRAD B. KRAUSKOPF
Stanford University, California

PAUL RAMDOHR
University of Heidelberg, Heidelberg, Germany

VOLUME 56

NEW HAVEN, CONNECTICUT
THE ECONOMIC GEOLOGY PUBLISHING COMPANY
1961

SOCIETY OF ECONOMIC GEOLOGISTS

THE PUBLICATIONS OF WHICH CONSTITUTE
A PART OF THIS JOURNAL

OFFICERS FOR 1961

PHILIP J. SHENON, *President*
JOHN K. GUSTAFSON, *Vice President*
EUGENE N. CAMERON, *Secretary*, Science Hall, University of Wisconsin, Madison 6, Wisconsin
JOSEPH T. SINGEWALD, JR., *Treasurer*, Johns Hopkins University, Baltimore 18, Maryland

Councilors

1961	*1962*	*1963*
VINCENT D. PERRY	S. WARREN HOBBS	ERNEST L. OHLE
STANLEY DAVIDSON	LYMAN H. HART	FREDERICK S. TURNEAURE
DESMOND F. KIDD	VINCENT C. KELLEY	ALFRED W. JOLLIFFE

OLAF N. ROVE, *President-Elect*
HAROLD M. BANNERMAN, *Vice President-Elect*
DUNCAN R. DERRY, *Past President*
CHARLES F. PARK, JR., *Past Vice President*

Regional Vice Presidents

BYRON B. BROCK, Africa
KINGSLEY CHARLES DUNHAM, Europe
LUIS SANTOS-YÑIGO, Asia
J. RUBEN VELASCO, North America
HADDON F. KING, Australia
ROBERT D. BUTLER, South America

Executive Committee

PHILIP J. SHENON, *Chmn.*
JOHN K. GUSTAFSON
DUNCAN R. DERRY
OLAF N. ROVE
JOSEPH T. SINGEWALD, JR.
EUGENE N. CAMERON

Standing Committees for 1961–62

Finance Committee

VINCENT D. PERRY, *Chairman*
OLAF N. ROVE
JOSEPH T. SINGEWALD, JR.

Program Committee

HAROLD L. JAMES, *Chairman*
W. M. FIEDLER
W. F. JENKS
CHARLES F. MICHENER
W. P. HEWITT
H. V. WARREN
H. V. W. DONOHOO

Committee on Publications

PHILIP J. SHENON, *Chairman*
CHARLES F. PARK, JR.
H. R. GAULT

Nominating Committee

S. WARREN HOBBS, *Chairman*
G. DONALD EMIGH
DONALD M. FRASER

Admissions Committee

JOHN C. FRYE, *Chairman*
VINCENT C. KELLEY
WARD C. SMITH
RALPH TUCK
FRANK ZURBRIGG

Program Policy Committee

CHARLES F. PARK, JR., *Chmn.*
WESTON BOURRET
JOHN K. GUSTAFSON
ROBERT S. MOEHLMAN
HAROLD M. BANNERMAN
HERBERT E. HAWKES, JR.

Auditing Committee

A. NELSON SAYRE, *Chairman*
THOR H. KIILSGAARD

CONTENTS OF VOLUME 56

Number 1

The Data of Lead Isotope Geology Related to Problems of Ore Genesis
R. S. Cannon, Jr., A. P. Pierce, J. C. Antweiler, and K. L. Buck 1

Tephroite in California Manganese Deposits
D. F. Hewett, C. W. Chesterman, and B. W. Troxel 39

Lead Isotopes in Ores and Rocks of Butte, Montana
V. Rama Murthy and Claire Patterson 59

Sulfide Ores Formed from Sulfide-Deficient Solutions.....*T. S. Lovering* 68

Nickel Occurrences in Soapstone Deposits, Saline County, Arkansas
P. J. Sterling and C. G. Stone 100

Distribution of Uranium Ore Deposits in the Elk Lodge Area, San Juan County, Utah.....*R. H. Campbell and R. Q. Lewis* 111

Mineralogy and the Question of Zoning, Northwestern Illinois-Zinc-Lead District
J. C. Bradbury 132

The Role of Replacement in the Origin of Some Cockade Textures
J. Kutina and J. Sedláčková 149

Thorium Mineralization in the Lemhi Pass Area, Lemhi County, Idaho
A. L. Anderson 177

Observations on Cation Exchange in Some Manganese Minerals by Electrodialysis
B. L. Sreenivas and R. Roy 198

Determination of Apparent Angles of Inclined Elements.....*J. C. Hagen* 204

B. S. Butler.....*A. M. B.* 210

Scientific Communications:

The Detection of Radio-Active Minerals With Infrared Aerial Photography
E. M. Winkler and Barry Voight 211

Placer Cassiterite of the "Manley Tin Belt," Alaska.....*K. W. Stanley* 213

Discussions:

Lead Isotopes in Ores and Rocks of Butte, Montana
J. G. Grunig, J. M. Guilbert and L. G. Zeihen 215

A Reply.....*V. R. Murthy and C. C. Patterson* 217

Reviews:

Geology of Ore Deposits (Geologiya Rudnykh Mestorozhdenii)
E. A. Alexandrov 219

Short Reviews or Recent Russian Books.....*C. F. Davidson* 226

Geology for South African Students, 4th Edit. (Hamilton and Cooke)..... 227

Physics of Precipitation (H. Weichmann, Editor)..... 228

Crystal-Structure Analysis (M. J. Buerger)..... 228

Books Received.....*Roger L. Ames and John E. Cotton* 229

Society of Economic Geologists..... 236

Scientific Notes and News..... 239

Number 2

Uranium Mineralization at the Midnite Mine, Spokane, Washington
Jonathan Barrington and Paul F. Kerr 241
Biogenic Sulfides.....*L. G. M. Baas Becking and D. Moore* 259
Ground-Water Control in the Neyveli Lignite Field, South Arcot District, Madras State, India.....*Paul H. Jones and V. Subramanyam* 273
Geology of the Temiscamie Iron-Formation, Lake Albanel Iron Range, Mistassini Territory, Quebec, Canada.....*Terence T. Quirke, Jr.* 299
Wall-Rock Alteration at the Cedar Bay Mine Chibougamau District, Quebec
Robert J. M. Miller 321
Paleozoic Banded Iron-Formations.....*J. E. O'Rourke* 331
Experimental Investigation of Solid Diffusion and Volatilization of Certain Metallic Sulfides.....*J. F. MacDougall, B. K. Meikle, J. V. Guy-Bray, V. A. Saull and J. E. Gill* 362
Ore Deposits of the Bannockburn Basin, Lardeau-Area, British Columbia
Burce Reed 392
The Pyrite Body and Copper Orebodies Cerro de Pasco Mine, Central Peru
Hector J. Ward 402
Late Pleistocene and Recent Accumulation of Uranium in Ground Water Saturated Sandstone Deposits.....*John N. Rosholt, Jr.* 423

Scientific Communications:
A Magnetite "Flow" in Northern Chile.....*Charles F. Park, Jr.* 431
Radioactivity in Monazite, Zircon, and "Radioactive Black" Grains in Black-sands of Rosetta, Egypt.....*Amin R. Gindy* 436

Discussions:
The Constitution of Davidite.....*J. R. Butler* 442
Ore Deposits and Sedimentary Features in Tennessee.....*E. L. Ohle* 444

Reviews:
Geology of Ore Deposits (Geologiya Rudnykh Mesotorozhdenii) Vol. 1, No. 2 (in Russian).....*Eugene A. Alexandrov* 447
Tectonic Developments of Czechoslovakia.....*C. F. D.* 451
Geological Survey in 1960.....*A. M. B.* 452
Methods and Techniques in Geophysics, Vol. I..... 453
Elements of Crystallography and Mineralogy (Wade and Mattox)..... 453
Geology of the Industrial Rocks and Minerals (R. L. Bates)..... 453
Books Received.....*John E. Cotton and Roger L. Ames* 454

Society of Economic Geologists..... 463

Scientific Notes and News..... 465

Number 3

Trace Elements in Pyrite, Pyrrhotite and Chalcopyrite of Different Ores
J. E. Hawley and Ian Nichol 467
Breccia and Pebble Columns Associated with Epigenetic Ore Deposits
Leonid Bryner 488
Copper, Vanadium, and Uranium Deposits in Sandstone—Their Distribution and Geochemical Cycles.....*Richard P. Fischer and John H. Stewart* 509

Anion Metasomatic Replacement Reactions.....*L. L. Ames, Jr.* 521
Chemical Characteristics of the Ground Water Resources of Jamaica, W.I. 1. A Contribution to the Interpretation of Hydrochemical Data
V. G. Hill and A. C. Ellington 533
Temperatures of Mineralization by Liquid Inclusions, Cave-In-Rock Fluorspar District, Illinois.....*Donald H. Freas* 542
Radioactivity and Tertiary Volcanic Activity in Egypt.....*Amin R. Gindy* 557
Rotation Properties of Certain Anisotropic Ore Minerals.....*E. N. Cameron, J. H. Davis, J. M. Guilbert, L. T. Larson, J. J. Mancuso and R. K. Sorem* 569
Relationships of General Structure to Gold Mineralization in the Kiol Area (Central Africa).....*R. Woodtli* 584
Mineralogy of the Ma On Shan Iron Mine, Hong Kong.....*S. G. Davis* 592
Gold Impregnation Deposits in the Moto Area (Central Africa).....*R. Woodtli* 603

Scientific Communications:
The Content of Trace Amounts of Silver in Galena Ores from Broken Hill, Australia.....*E. J. Bounsall* 608
Contact Metasomatic Copper Mineralization of the Calzada Mine, Peru
W. C. Stoll 612

Discussions:
Structural History of the Beaverlodge Area.....*Patrick Arthur Hill* 614
Intriguing Examples of Geology Applied to Industrial Minerals
Dooley P. Wheeler, Jr. 617

Reviews:
Geology of Ore Deposits (Geologiya Rudnykh Mestorozhdenii)
E. A. Alexandrov 619
The Geological Evolution of North America—A Regional Approach to Historical Geology (T. H. Clark and C. W. Stearn)..... 623
Paleogeologic Maps (A. L. Levorsen)..... 623
From Theory to Practice in Soil Mechanics..... 624
Tropical Africa (G. H. T. Kimble)..... 624
Introduction to Geophysical Prospecting (M. B. Dobrin)..... 625
Books Received.....*Roger L. Ames and John E. Cotton* 625

Scientific Notes and News 633

Number 4

Economic Aspects of Archaean-Proterozoic Boundaries.....*Duncan R. Derry* 635
Equilibria in Sulfur-Containing Aqueous Solutions, In The System Fe-S-O, and Their Correlation During Ore Deposition.....*H. L. Barnes and G. Kullerud* 648
Some Possible Geologic Relationships In The Formation of Uranium^{235} from Curium^{247}.....*Hans H. Adler* 689
Genesis and Control of the Linchberg Orebody Socorro County, New Mexico
Spencer R. Titley 695
Distribution of Minor Elements in the Gonditic Manganese Ores and Its Geochemical Significance.....*Asoke Mookherjee* 723
The Metasomatic Replacement of Limestones by Alkaline, Fluoride-Bearing Solutions.....*L. L. Ames, Jr.* 730
Geology and Ore Deposits of the Mattagami Area, Quebec.....*C. P. Jenney* 740
Crystal Habit and Trace Element Content of Some Galenas
Royal R. Marshall and Oiva Joensuu 758

Geology of Cleora Mining District Gypsum Deposits, Wellsville Area, Colorado
C. C. Reeves, Jr. 722
Occurrence of Radioactive Fluoritic Sandstone, Wet Mountains, Colorado
Robert E. Boyer 780

Scientific Communications:
A Magmatic-Pegmatitic-Hydrothermal Sequence at Lacorne, Quebec
Robin Brett 784
Geological Periodicals of Mainland China.....*Pow-Foong Fan* 786

Discussions:
Barren and Productive Intrusive Porphyry.....*Robert Greenwood* 790
Patterns to Ores in Layered Rocks.....*Peter L. Siems* 790
Kolar Gold Field, India.....*M. R. Srinivas Rao and B. L. Sreenivas* 793

Reviews:
Short Reviews of New Russian Books.....*Eugene A. Alexandrov* 794
Geologie von Mitteleuropa (Paul Dorn).....*Ervin G. Otvos* 801
Fracture Systems and Tectonic Elements of the Colorado Plateau (Kelley and Clinton).....*Frank E. Kottlowski* 801
Beaches and Coasts (C. A. M. King).....*John E. Sanders* 802
Books Received.....*Roger L. Ames, Eric S. Cheney and John E. Cotton* 803

Society of Economic Geologists..... 811

Scientific Notes and News..... 812

Number 5

Geochemical Prospecting Investigations in the Northern Rhodesian Copperbelt
J. S. Tooms and John S. Webb 815
Minor Elements in a Metasomatic Zone Related to a Copper-Bearing Pyrite Deposit.....*Yoshimasu Kuroda* 847
A Comparison of Analytical Methods Used in Geochemical Prospecting for Copper
L. C. Huff, T. G. Lovering, H. W. Lakin and A. T. Myers 855
Bedded Pyrite and Micro-Organisms from the Mount Isa Shale
L. G. Love and D. O. Zimmerman 875
Some Aspects of Archean Structure and Mineralization.....*A. M. Goodwin* 897
Geology and Origin of Mineralized Breccia Pipes in Copper Basins, Arizona
W. P. Johnston and J. David Lowell 916
Beryllium-Bearing Tuff in the Thomas Range, Juab County, Utah
Mortimer H. Staatz and Wallace R. Griffitts 941
A Syngenetic Copper Deposit of Recent Age.....*D. C. Fraser* 951
Studies on the Oxidation of Magnetite.....*K. V. G. K. Gokhale* 963
Bauxite in Sarawak.....*E. B. Wolfenden* 972

Scientific Communications:
Modified Field Method for the Determination of Nickel in the Presence of Copper.....*V. G. Hill and A. C. Ellington* 982
A Short Review of Peru's Mineral Resources.....*W. C. Stoll* 985
An Unusual Occurrence of Molybdenite, In a Manganese Mine, in Tailevu Province, Fiji.....*M. J. Rickard* 991

Discussions:

Conditions for Ilmenite Alteration.....*Langtry E. Lynd* 994
Kolar Gold Field, India.....*T. Pryor* 995
Postdepositional Alteration of Sandstone Minerals Under Acidic Reducing Conditions: A Factor in the Interpretation of Sandstone Texture
B. K. Holdsworth 996
Iron Formations in the Southeastern States.....*Virgil I. Mann* 997

Reviews:

Geology of Ore Deposits (Geologiya Rudnykh Mestorozhdenii (Vol. 1, No. 5)
Eugene A. Alexandrov 1001
Short Reviews of Recent Russian Books.....*C. F. Davidson* 1006
Die Geologie Mittelamerikas (R. Weyl).....*Ervin G. Otvos* 1007
Energy in the American Economy, 1850–1875 (Schurr and Netschert)..... 1008
Grundlagen der Angewandten Geophysik fur Geologen (Hermann Reich).... 1009
Geologie Stratigraphique (Maurice Gignoux)..... 1009
Books Received.....*Eric S. Cheney and Roger L. Ames* 1010

Scientific Notes and News..... 1015

Number 6

Cation Metasomatic Replacement Reactions.....*L. L. Ames, Jr.* 1017
Geochemical Prospecting for Nickel in the Blue Mountain Area, Jamaica, W.I.
V. G. Hill 1025
Secondary Glauconite in the Biwabic Iron-Formation of Minnesota
S. A. Tyler and S. W. Bailey 1033
Source of Brackish Ground Water in Pleistocene Formations Beneath the Dutch Polderland.....*A. Volker* 1045
Studies on the Oxidation of Goethite.....*K. V. G. K. Gokhale* 1058
Organic Sequestration of Copper.....*D. C. Fraser* 1063
Possible Masked Heavy Mineral Deposit, Florida Panhandle
W. F. Tanner, Allan Mullins, and J. D. Bates 1079
The Stratigraphic Succession and Structure in the Zinc Corporation Ltd. and New Broken Hill Consolidated Ltd., Broken Hill, New South Wales
D. S. Carruthers and R. D. Pratten 1088
The Iron Ore Deposits of El-Bahariya Oasis, Egypt.....*F. M. Nakhla* 1103
Pumice and Perlite in a Rhyolite Complex in Hungary.....*Ervin G. Otvos, Jr.* 1112
Metallogenic Maps.....*A. H. Lang* 1123

Scientific Communications:

The Use of Clinoptiloite to Remove Potassium Selectivity from Aqueous Solutions of Mixed Salts.....*L. L. Ames, Jr. and R. W. Mercer* 1133

Discussions:

Ore Deposits and Sedimentary Features in Tennessee.....*David L. Kendall* 1137
Leucoxene Terminology and Genesis.....*H. G. Golding* 1138
Breccia and Pebble Columns Associated with Epigenetic Ore Deposits
W. J. Walker 1149

Reviews:

Short Reviews of New Russian Books.....*C. F. Davidson* 1151
Geologic Map of California, Olaf P. Jenkins Edition.....*Richard H. Jahns* 1154

Geology of Ore Deposits (Geologiya Rudniykh Mestorozhdenii), Vol. 1, No. 6) *Eugene A. Alexandrov* 1156
Geosynklinale Lagerstetten, was dazu gehört, und was nicht dazu gehöort, sowie deren Beziehungen zu Geotektonik und Magmatismus (H. Borchert) *Ervin G. Otvos, Jr.* 1161
Geology of the U.S.S.R.—A Short Outline (D. V. Nalivkin) 1162
The Precambrian Geology and Geochronology of Minnesota (S. S. Goldich et al.) 1162
Books Received.....*Roger L. Ames and Eric S. Cheney* 1163

Society of Economic Geologists..... 1170

Scientific Notes and News..... 1178

Number 7

Sandstone-Type Uranium Deposits at Ambrosia Lake, New Mexico—An Interim Report.....*H. C. Granger, E. S. Santos, B. G. Dean, and F. B. Moore* 1179
Some Aspects of the Geochemistry of Sphalerite, Central City District, Colorado *P. K. Sims and P. B. Barton, Jr.* 1211
Mineralogy and Genesis of the Wolframite Ore Deposits, Needle Hill Mine, New Territories, Hong Kong.....*S. G. Davis* 1238
Prospecting for Ore Deposits by Panning Heavy Minerals from River Sands *Gunter Zeschke* 1250
Tertiary Channel Gold Deposits at Tipuani, Bolivia.....*W. C. Stoll* 1258
The Lead, Copper, Zinc, and Molybdenum Content of Some Limestones and Related Rocks in Southern Ontario.....*H. V. Warren and R. E. Delavault* 1265
Phase Relations in the System Ni-As.....*R. A. Yund* 1273
Some Chemical Aspects of Bauxite Genesis in Jamaica.....*D. J. Burns* 1297
Hugh Exton McKinstry.....1304

Scientific Communications:
Description and Origin of Sulfides in Pillow Lavas, Maybrun Mines Property, Kenora District, Ontario, Canada.....*H. B. Montgomery* 1305
A New Core Orientation Device.....*Eric Roxström* 1310

Discussions:
Economic Aspects of Archaean-Proterozoic Boundaries.....*F. Fitz Osborne* 1314
Chemical Characteristics of the Ground Water Resources of Jamaica, W.I. *H. R. Versey* 1316

Reviews:
Geological Nomenclature (A. A. G. Schieferdecker, Edit.)..*E. A. Alexandrov* 1318
Geologie von Bayern (Adolf Wurm).....*E. G. Otvos* 1318
Geology of the Arctic (G. O. Raasch, Edit.)..... 1319
The Earth Today (A. H. Cook and T. F. Gaskell, Editors)..... 1320
Mahadevan Volume—A Collection of Geological Papers (M. S. Krishnan, Edit.)..... 1320
Books Received.....*Eric S. Cheney and Roger L. Ames* 1320

Society of Economic Geologists..... 1328

Scientific Notes and News..... 1343

Number 8

Remanent Magnetism and the Origin of Hard Hematites in Precambrian Banded Iron Formation.....*W. H. Gross and D. W. Strangway* 1345
The Iron Content of Sphalerite from the Central District, New Mexico and the Bingham District, Utah.....*Arthur W. Rose* 1363
Iron Ore Resources of the North-Eastern Congo.....*R. A. Woodtli* 1385
Uranium Migration and Geochemistry of Uranium Deposits in Sandstone Above, At, and Below the Water Table
Part I.....*John N. Rosholt, Jr.* 1392
Part II.....*Charles S. Robinson and John N. Rosholt, Jr.* 1404
Crocidolite from the Koegas-Westerberg Area, South Africa
J. J. Le R. Cilliers, A. G. Freeman, A. Hodgson, and H. F. W. Taylor 1421
Volume Relationships During Replacement Reactions.....*Lloyd L. Ames, Jr.* 1438
Temperatures of Formation and Origin of the Nigadoo and Brunswick Mining and Smelting No. 6 Deposits, New Brunswick, Canada.....*J. Kalliokoski* 1446
Copper, Lead, and Zinc in Rivers Draining Chilean Andes.....*Ann de Grys* 1456

Scientific Communications:

Brief Outline of a Possible Origin of Copper Porphyry Breccias..*Paul Kents* 1465
Uranium-Bearing Bodies in the Ore Deposits of Traversella (Italy)
Stefano C. Zucchetti 1469

Discussions:

Gold-Bearing Lodes, Kolar, India.....*S. Borooah and U. C. Hazarika* 1472
Paleozoic Banded Iron-Formations.....*H. N. Rhoden* 1473
Chemical Characteristics of the Ground Water Resources of Jamaica, W.I.
V. G. Hill and A. C. Ellington 1473

Reviews:

Geology of Ore Deposits, Vol. 2, No. 1.....*E. A. Alexandrov* 1476
Short Reviews of New Russian Books.....*C. F. Davidson* 1481
Structural Geology of Canadian Ore Deposits, Vol. II..... 1483
Lehrbuch der Angewandten Geologie (A. Bentz, Editor).....*Ervin G. Otvos* 1483
Books Received.....*Roger L. Ames and Eric S. Cheney* 1484

Society of Economic Geologists..... 1491

Scientific Notes and News 1496

Index, Volume 56.....*Robert B. McGraw, Jr.* 1497

Contents, Volume 56..... iii